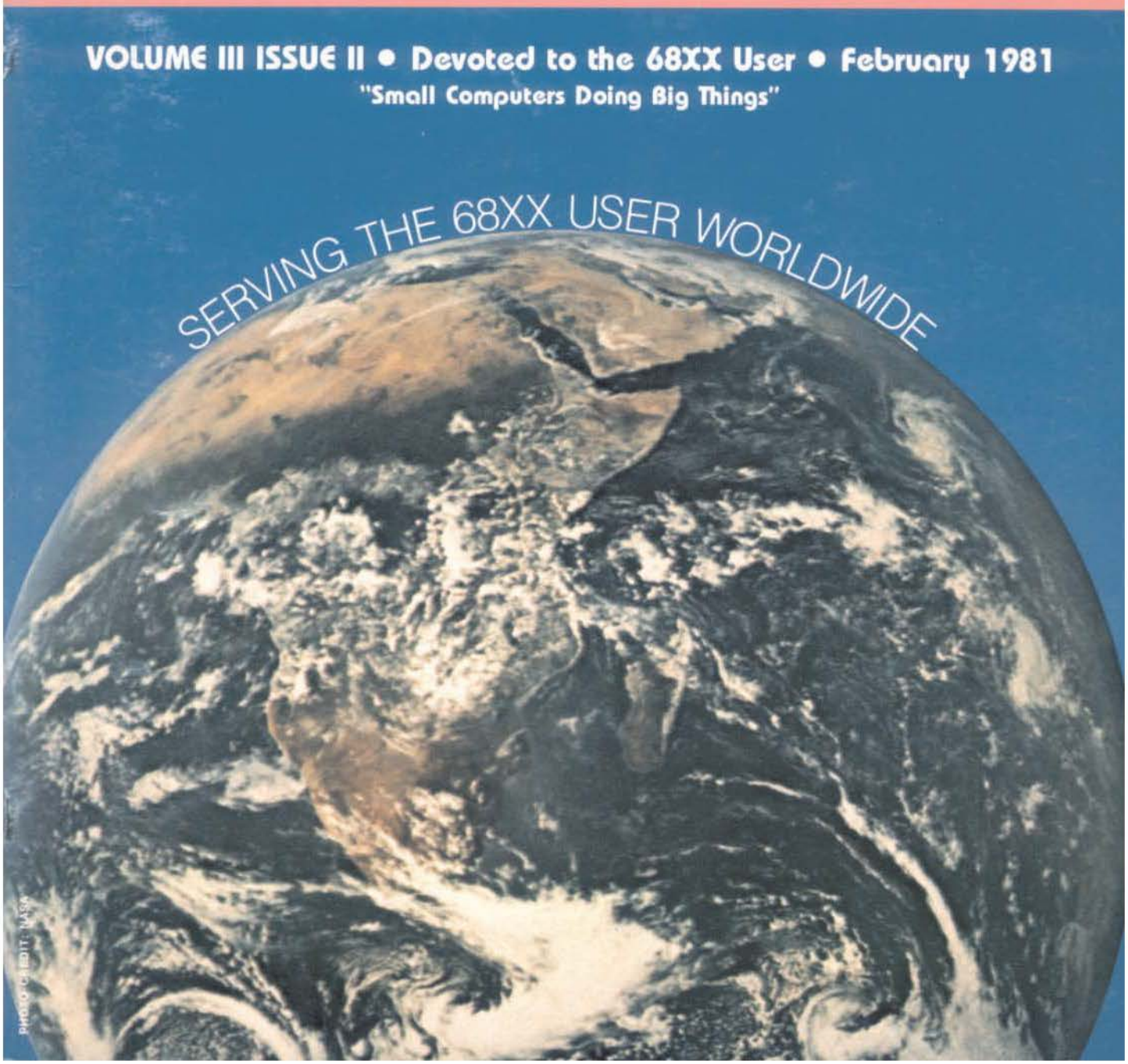
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The design of UniFLEX, with its hierarchical file system and device independent I/O, allows the creation of a variety of complex support programs. There is currently a wide variety of software available and under development. Included in this list is a Text Processing System for word processing functions, BASIC interpreter and precompiler for general programming and educational use, native C and Pascal compilers for more advanced programming, sort/merge for business applications, and a variety of debug packages. The standard system includes a text editor, assembler, and about forty utility programs. UniFLEX for 6809 is sold with a single CPU license and one years maintenance for $450.00. Additional yearly maintenance is available for $100.00. OEM licenses are also available.

FLEX™

UniFLEX is offered for the advanced microprocessor systems. FLEX, the industry standard for 6800 and 6809 systems, is offered for smaller, single user systems. A full line of FLEX support software and OEM licenses are also available.

technical systems consultants, inc.
Box 2570, West Lafayette, IN 47906
(317) 463-2502 Telex 276143

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'68' MICRO JOURNAL

Portions of text prepared using the following.

SWTPC 6800-6809-DMAF2-CDS1-CT82-Sprint 3
Southwest Technical Products
219 W. Rhapsody
San Antonio, Texas 78216

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Box 2573, W. Lafayette, IN 47906
FLEX is TM of TSC

GIMIX Super Mainframe-Assorted memory boards
GIMIX Inc.
1337 West 37th Place
Chicago, Il 60609

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— Phone —
Office: 615-870-1993
Plant: 615-892-7544

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'68' Micro Journal is published 12 times a year by '68' Micro Journal, 6131 Airways Blvd., Chattanooga, TN 37421. Second Class postage paid at Chattanooga, TN. Postmaster: Send Form 3579 to '68' Micro Journal, PO Box 849, Hixson, TN 37343.

1-Year $18.50 2-Year $32.50 3-Year $48.50

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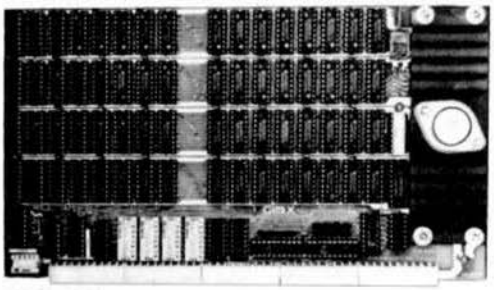
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INTRODUCING

6809 SOFTWARE POWER TOOLS

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OS-9™ MULTIPROGRAMMING OPERATING SYSTEM

A true multitasking, real time operating system for timesharing, software development, database, process control, and other general applications. This versatile OS runs on almost any 6809-based computer.

■ UNIX™ like file system with hierarchical directories, byte-addressable random-access files, and full file security.

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■ *OS-9 Level Two* uses hardware memory management and can address over one megabyte of memory. Also includes pipes and filters for inter-process data transfers.

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A full-feature *screen-oriented* word processing system for interactive document entry and editing. Has cursor-oriented commands with dynamic screen refresh so the display is an exact image of the printed text.

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■ Formatting commands for: paging; left, right and center justification; headers and footers; line length and margins; and much more.

■ I/O drivers for many popular video terminals including Hazeltine, ADDS, SWTPC, GIMIX and others.

☐ Standard version $175.00

☐ Special version for proportional printers $195.00

BASIC09™ PROGRAMMING LANGUAGE SYSTEM

Extended BASIC language compiler/interpreter with integrated text editor and debug package. Runs standard BASIC programs *or* minimally-modified PASCAL programs.

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■ Additional control statements for structured programming: IF ... THEN ... ELSE, FOR ... NEXT, REPEAT ... UNTIL, WHILE ... DO, LOOP ... ENDLOOP, EXITIF ... ENDEXIT.

■ Allows user-defined data types and complex data structures. Five built-in data types: byte, integer, 9 digit floating-point, string and boolean.

■ Outperforms any other BASIC on any 8-bit MPU.

■ Available on disk. Runs under OS-9™ Level One or Level Two.

☐ Disk $195.00*

OS-9™ TEXT EDITOR

Minimum-keystroke macro text editor useful for text preparation or interactive word processing.

■ User-defined macros with parameters permit virtually unlimited command expansion. Macros can be saved, loaded and edited.

■ Buffer, line and character oriented commands.

■ Search, change and extend operations.

■ Permits multiple input/output files.

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OS-9™ INTERACTIVE ASSEMBLER

Compact Motorola compatible assembler for machine language program development.

■ Operates in "batch" mode *or* interactive line-by-line mode.

■ Facilities for generation of OS-9™ memory modules and system calls.

■ Formatted listings include syntax *and* context error checking.

■ Runs on OS-9™ Level One or Level Two.

☐ Disk $95.00

OS-9™ INTERACTIVE DEBUGGER

Facilitates testing and debugging of machine- language programs.

■ Includes common "monitor" functions: memory examine/change, breakpoints, display/change registers, etc.

■ Calculator mode evaluates arithmetic expressions in hex, decimal or binary.

■ Access to system commands.

■ Available on ROM and disk.

☐ Disk $35.00

☐ ROM (2716) $50.00

BASIC09 and OS-9 are trademarks of Microware® and Motorola. UNIX is a trademark of Bell Laboratories.

Most software is available on ROM, and diskette in versions for many popular 6809 computers. Source listings and yearly maintenance/update service are sold separately for most programs.

*Specify manufacturer and type of CPU and I/O controllers. Contact Microware® for specific availability.



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INNOVATION AND PERFORMANCE

6800 SOFTWARE SUPER POWER

BY MICROWARE*

A/BASIC COMPILER

This BASIC compiler generates pure, fast, efficient 6800 machine language from easy to write BASIC source programs. Uses ultra-fast integer math, extended string functions, boolean operators and real-time operations. Output is ROMable and *runs without any run-time package.* Disk versions have disk I/O statements and require 12K memory and host DOS.

☐ Disk Extended Version 2.1
SSB or FLEX* Diskette $150.00

A/BASIC SOURCE GENERATOR

An "add-on" option for A/BASIC Compiler disk versions that adds an extra third pass which generates a full assembly-language output listing *and* as embly language source file. Uses original BASIC names and inserts BASIC source lines as comments.

☐ SSB or Flex* Diskette $95.00

A/BASIC INTERPRETER

Here it is - a super-fast A/BASIC compiler! Now you can interactively edit, execute and debug A/BASIC programs with the ease of an interpreter - then compile to super efficient machine language. Also a superb stand-alone applications and control- oriented interpreter. Requires 8K RAM. The cassette version is perfect for Motorola D2 kits.

☐ SSB or Flex* Diskette $95.00

LISP INTERPRETER

The programming Language LISP offers exciting new possibilities for microcomputer applications. A highly interactive interpreter that uses list-type data structures which are simultaneously data and executable instructions. LISP features an unusual structured, recursive function-oriented syntax. Widely used for processing, artificial intelligence, education, simulation symbolic, and computer-aided design. 6800 LISP requires a minimum of 12K RAM.

☐ SSB or Flex* Diskette $95.00

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RT/68 REAL TIME OPERATING SYSTEM

MIKBUG — compatible ROM that combines an improved monitor/debugger with a powerful multitasking real-time operating system. Supports up to 16 concurrent tasks at 8 priority levels plus real time clock and interrupt control. Thousands in use since 1976 handling all types of applications. Available on 6830 (MIKBUG-type) or 2708 (EPROM-type) ROM. Manual is a classic on 6800 real-time applications and contains a full source program listing.

☐ RT68MX (6830) $75.00
☐ RT68MXP (2708) $75.00

6800 CHESS

A challenging chess program for the 6800. Two selectable difficulty levels. Displays formatted chess boared on standard terminals. Requires 8K memory. Machine language with A/BASIC source listing.

☐ SSB or FLEX* Diskette $50.00

Our software is available for most 6800 systems on diskette unless otherwise noted. Phone orders welcomed. We accept MASTERCHARGE and VISA. We try to ship orders within 24 hours of receipt. Please call or write if you require additional information or our free catalog. Microware* software is available for OEM and custom applications.



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STYLOGRAPH WORD PROCESSOR FOR OS-9*

Stylograph is a full-featured screen-oriented word processing program for creating and printing documents. Stylograph's interactive operation and human-engineered features make it the most accurate and easy-to-use kind of document-preparation system. Cursor-based editing commands and real-time screen refresh always gives an accurate picture of what the printed document will look like.

■ Powerful Editing Commands

The display cursor can be moved character-by-character, line-by-line, or page-by-page in any direction. The full compliment of "cut-and-paste" edit commands permit blocks of text to be moved, copied, searched for, replaced and deleted. The "global replace" command searches for each occurance of a given text string and allows selective replacement with another string. In the "insert" mode the text is actually formatted before your eyes as you type!

■ Complete Formatting Control

Text or individual lines can be center, left, right, or left-and-right justified; page and line width can be specified; multiple tabs can be set anywhere. You can define page heading, footers, page numbering, identation and line spacing.

■ Versatile Video Terminal Interface

The basic Stylograph module uses a "personality module" to define the display control codes used by many brands of video terminals and memory-mapped video displays including: Hazeltine 1400/1500 series; Lear-Seigler ADM3-A; GIMIX 80x24; SWTPC CT-82 and 8212; and ADDS Regent series.



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JCP
Job Control Program
By Peter Murray

The JOB CONTROL PROGRAM (JCP) reads a text file that contains the necessary input for a program and then supplies this input to the program in the same manner that an operator would have normally entered it from the keyboard. The file containing the input is referred to as the procedure file, and any program receiving the input is referred to as the calling program. A procedure file can contain inputs for both calling programs as FLEX™ FILE UTILITY ——— and other development software.

LIBJCP is used as a FLEX™ command within a procedure to load and execute another procedure. At the conclusion of the called procedure, control will return to the calling procedure and execution will resume at the line following the LIBJCP command.

JCP also provides for parameter substitution within the procedure file, special commands to control JCP program flow, and a means for recovery from processing errors. These features allow for commonly used file routines to be written as a generalized procedure that JCP will execute, unattended, simply by entering a single FLEX command.

See Review in July '80 68 Micro

Includes Source on Disk **PRICE $89.95**

REMOTE
Intelligent Terminal Program
By Tom Speer

REMOTE allows use of your 6800 or 6809 system as a terminal to a remote computer. REMOTE gives you access to the new, inexpensive time sharing systems designed for home computer users, such as MICRONET or THE SOURCE, or any other time sharing system. You can also use REMOTE to talk to another microcomputer system. All you need is your FLEX™ based 6800 or 6809 disk system, a serial interface, a modem, and REMOTE.

REMOTE is flexible. You can respond to many questions and options thru local commands at any time. Output from the host system (from the phone line) may be directed to the console CRT, the system printer, or a disk file, or any combination of the three. You can change parity checking, control character definitions, etc. You can read files from disk to the phone line under user control. You also can issue any FLEX command while you are not receiving data.

REMOTE is a terminal program designed to give you the utmost in flexibility and convenience with as many different time sharing systems as possible. It was written by Tom Speer P.E., an Electrical Engineer with over 6 years of data communications hardware and software experience. Remote will support the New Thomas Instruments Modem Card.

Includes Source on Disk. **PRICE $39.95**

READTEST
English Text Analysis Program
By Dale Puckett

READTEST is a must for all writers and writing instructors. Reads prose from disk file and tells how well it was written. Reports number of lines, words, sentences, paragraphs, words/sentence, words/paragraph, sentence length, unfamiliar words, pinpoint trouble areas. Overall index tells you how hard it is and who could print it. Runs in FLEX™. READTEST, a 6800 assembly language program written by 68 Micro Journal Contributing Editor Dale L. Puckett, is a machine independent applications program for all writers, fiction or non-fiction, student or professional. READTEST reads your letters, short stories, news stories, reviews, novels, etc., from the disk file you prepared them on and tells you how well they were written. READTEST is a powerful tool designed to aid both the student writer and today's running check on the experienced writer. It is a serious application of your 6800 microcomputer that will pay for itself with the first check you receive for a readable manuscript.

Approx. 12K Includes Source on Disk **PRICE $34.95**

See Review in August '80 '68' Micro

ESTHER
An exercise in artificial intelligence
By Dale Puckett

ESTHER is Eliza plus. Artificial intelligence in pure 6800 code. Her source shows you how. Her object will amaze your friends. ESTHER remembers names, drops them, uses the player's name, and echos keywords. ESTHER contains more than 75 keywords and uses almost fifty sets of replies. A few of the sets contain as many as 21 replies to help her avoid redundancy. ESTHER features auto line length and runs in FLEX™. She obeys TTYSET. She is both educational and fun. ESTHER, written by 68 Micro Journal Contributing Editor, Dale L. Puckett, is the result of a two year long experiment with artificial intelligence in 6800 assembly language. ESTHER randomly inserts the player's name in the conversation. Occasionally, she uses part of the player's reply in the middle of her answer or next question. ESTHER has the ability to echo keywords. This allows her to respond to replies from the player which are in the third person. ESTHER also has proper nouns and uses them in her replies. She also saves them for later use.

Includes Source on Disk APPROX. 16K **PRICE $39.95**

Watch For Additional Listings . . .

SOFTWARE ANNOUNCEMENT

IT'S ALL HERE



Dataman
DATABASE MANAGEMENT

SOMETHING FOR EVERYONE . . .

Dec. 23, 1980

DATAMAN
Database Management
By Thomas L. Chichester

DATAMAN is a sequential file database system consisting of 16 menu driven programs plus the menu and some support programs. Some of it's more important features are:

- Easy to use - requires no programming skills
- Easy to modify - straight forward approach
- Small program with the main subroutines included!
- No limit to the size of the records.
- SOURCE on disk for ALL the programs included!
- Easy to interface with other programs you may already have.
- Works with any terminal thru a system file.
- Uses TSC's fast Sort/Merge instead of Basic for all sorts.

Plus many more.

We received our preliminary copy of DATAMAN back in October, 1980 to evaluate. This was a very opportune time for us as we were in need of a program of this type to do an invoice breakdown for the business. The problem is to take each invoice, break it into 30 different categories and then to produce 7 different reports from this information for each worker etc. This took about 5 or 6 hours each week to do by hand, was error prone and obviously time consuming.

I took the manual home the first night and read it through. The next day Helene, our office manager, and I got it up and running in less than 2 hours. That was kind of amazing, because, by up and running I mean we had the thing running doing this invoice breakdown in less than 2 hours! Since then, we have been using DATAMAN on a weekly basis doing this 5 hour task in less than an hour each week with NO errors.

The sequential file that it uses has the potential of becoming a problem if your files are getting very large. However, we are using it with about 60 invoices a week with 40 fields on each invoice for a total of 2400 items or so and consequently, it does not get to be a problem until about the third week. Because of this, we are using the facility within DATAMAN to create separate databases for each week and then at the end of the month we append them together to get an overall monthly report. Since the program saves us some 20 hours a month I find it very worthwhile and very useful. This is just one of the many uses we put it to.

It's a general database program having all of the common facilities that most database programs have; report writing, statistical analysis, creating, editing and adding to different types of databases. It also has the ability to sort or merge a database, but instead of a slow Basic program it uses the TSC Sort/Merge package to do this. It's not part of the program so it would require that separately. Its written in TSC Extended Basic and will run very economically on any 6800 or the 6809 Flex based computer with a 32K configuration.

The sequential files have several advantages over the random files. First, I should say that the only advantage a random file database would have over sequential file database, if they were both equally written, is when a file became very very large or a file required a lot of editing. In most cases this is not the case as we've proven in our own use and as a consequence I feel very good about supplying this package. I think it will serve a lot of needs. The sequential file database has several advantages over a random file database. It takes less memory for the programs themselves to run. It takes less disk space for both the programs and the files. Sequential files require only the amount of disk space that they need for the data, where a random file uses the disk space whether it's empty or not. In our case 60 invoices with 40 fields each takes about 34 disk sectors or about 8 1/3 K. The same file as a random file would be about 76 sectors or about 18 3/4K! More than DOUBLE the amount. There is no limit to the record size whereas in Basic you are limited to 252 bytes per record.

Sequential files automatically match up with the TSC text editor. There's no fooling around having to copy from a random file to a sequential file in order to use the power of the TSC Sort/Merge package with DATAMAN, it's tailored for it. Also because they're sequential files, the programs are much smaller, much easier to understand and much really simplified they're easier to change. For this reason, we include all of the source files for all of the programs on the disk, including a very handy blank of a typical program that has all the common subroutines etc. so all you have to do is fill in a holes.

Let me give you an example of how easy it is to modify a program. In our invoice reporting use, we had to have the capability to add up all of the different items in the invoices and compare them to the total of the invoice. All of these different things were in the database. This was not built into the program, so as a consequence I had to write a little program that went through each database record, added up all the fields and compared it to the total field to see if it was the same and report any errors. Believe it or not, I was able to do this in less than 15 minutes. The program is only about a page and half long and its not too elegant, but that is one of the powers and one of the advantages of using a sequential file database.

If you'd like to find out more about it we have some more information we can send you. Or, we can sell you the manual which is one of the nicest manuals I've ever had the pleasure to work with, it's the easiest, most clearcut that we've had. The price of DATAMAN is only $149.95. That includes the manual in a hardbound loose leaf binder, the disk with both the SOURCE and the compiled programs and there's also complete information on how to modify and create your own databases to do a variety of different things.

System requirements - Flex operating system - 32K minimum - Dual 5" or 8" drives - TSC Extended Basic - If sorts are required TSC Sort/Merge.

PRICE $149.95

Includes - Diskette with source and compiled programs - Owners manual in a hard cover binder with a tutorial - complete documentation.

X-FORTH
Enhanced FIG Forth for FLEX
By Dr. Charles E. Eaker

Forth is the second program I would like to tell you about. This is a program we are calling X-FORTH. The X stands for Flex compatible. (FIG by Flex compatible.) I mean completely, totally Flex compatible. We use all Flex type files, there's no special disk format or anything like that. FORTH normally uses the random files of Flex like Basic uses, only we use our own disk read and write routine so that we get around the slowness of Flex's random access. As a matter of fact with FORTH the disk access is probably on the order of five times faster than Flex's standard disk access. It also allows you to have complete compatibility between any data files that are written on Basic

This is also an enhanced FIG version of FORTH adding a lot of Flex compatible commands to give it complete access to the operating system, monitor and everything else.

It comes complete with the editor, assembler and a very extensive manual that's close to 200 pages as of this writing. Please call us to price and availability.

CC-FORTH
Enhanced FIG Forth for the TRS-80 Color Computer
By Dr. Charles E. Eaker

This will be an EPROM based FORTH configured especially for the Color Computer. We hope to have more information by the time this ad is out.

master charge VISA

FRANK HOGG LABORATORY, Inc.
130 Midtown Plaza
Syracuse, N.Y. 13210
315 474-7866

All software is currently available on FLEX™ 2.0 5" soft sectored disks and DMAF 8" Flex disks. The package includes: a users manual, disk with object code, FULLY COMMENTED SOURCE LISTING, a programming manual with information about the program, hints for changes and where applicable, example programs. VISA and MC accepted. SOURCE TCF339

DEALER INQUIRY ENCOURAGED. Contact Frank Hogg for more information.

ATTENTION PROGRAMMERS!
We are looking for quality software to market. Contact Frank Hogg.

Epson MX-80 Print Sample

Shown are five of the twelve possible variations of print characters.

South East Media
P.O. Box 794 Hixson, TN 37343
1-615-870-1993

10 CPI Standard

```
ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyzabcdefghijklmnopqrstuvwxyz
1234567890123456789@!#$%&' ()*=+<>?!#$%&' ()*=+<>?
EPSON MAKES MORE PRINT MECHANISMS THAN ANYONE ELSE IN THE WORLD.
Epson makes more print mechanisms than anyone else in the world.
```

10 CPI Emphasized

```
ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyzabcdefghijklmnopqrstuvwxyz
1234567890123456789@!#$%&' ()*=+<>?!#$%&' ()*=+<>?
EPSON MAKES MORE PRINT MECHANISMS THAN ANYONE ELSE IN THE WORLD.
Epson makes more print mechanisms than anyone else in the world.
```

5 CPI Double Emphasized

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890;-!#$%&' ()*=+<>?
EPSON MAKES MORE PRINT MECHANISMS
Epson makes more print mechanisms
```



8.25 CPI Double Emphasized

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890;-!#$%&' ()*=+<>?
EPSON MAKES MORE PRINT MECHANISM
Epson makes more print mechanism
```

16.5 CPI Standard

```
ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyzabcdefghijklmnopqrstuvwxyz
1234567890123456789@!#$%&' ()*=+<>?!#$%&' ()*=+<>?
EPSON MAKES MORE PRINT MECHANISMS THAN ANYONE ELSE IN THE WORLD.
Epson makes more print mechanisms than anyone else in the world.
```

Print method	Serial impact dot matrix
Print Rate	80 CPS
Print Direction	Bidirectional
Number of Pins in Head	9
Matrix	9x9
Line Spacings	1/6", 1/8", 7/72", plus programmable
Throughput at 10 CPI	Logical seeking function 80 LPM, 20 character line 73 LPM, 40 character line 46 LPM, 80 character line

PRINTING CHARACTERISTICS

Character Set	Full 96 character ASCII with descenders
Graphics Characters	64 Block characters
Printing Modes	Standard Double (adjacent pages 1.26th and repeat line) Emphasized (shift right and double strike) Double Emphasized (combination of above)

PRINTING SIZES	Characters per line	Max. Characters per line
Normal	10	80
Normal Expanded	5	40
Compressed	16.5	132
Compressed Expanded	8.25	66

FORMS HANDLING

Line Feed	Programmable length 1 to 4.572inch
Form Feed	Programmable length 1 inch basis
Horizontal Tab	16 positions
Vertical Tab	16 positions

MEDIA HANDLING

Paper Feed	Adjustable friction or tractor pin feed
Paper Width Range	4 to 10
Number of Parts	5
Paper Path	Rear

INTERFACES

Standard	Centronics style 8 bit parallel
Optional	RS232 IEEE488
Buffer Size	1 line

SWITCHES LIGHTS DETECTORS

Indicators	Power Light, Printer Ready, Paper Out, On Line
Switches	Power On Off, On Line, Form Feed, Line Feed
Detectors	Internal buffer (with response to Paper Out and error conditions with a periodic 3 second buzz for 30 seconds

RELIABILITY

Print Head Life Expectancy	50 to 100 x 10^6 characters
MCBF (Excluding Print Head)	5 million lines

INKED RIBBON

Color	Black
Type	Cartridge
Life Expectancy	3 Million characters

ENVIRONMENTAL CONDITIONS

Operating Temperature Range	41°F to 95°F
Operating Humidity	10 to 80% non-condensing

POWER REQUIREMENT

Voltage	117V, 60Hz
Current	1.1 amp
Power Consumption	100 VA maximum

SELF TEST MODE

Depressing Line Feed Switch while turning power ON engages self test which prints all characters in ROM

PHYSICAL CHARACTERISTICS

Height	4.5"
Width	14.7"
Depth	12.8"
Weight	12 lbs

Specifications subject to change without notice

$595.00

Parallel
(Centronics Type)

Add $7.50 Shipping and Handling, Allow Stock to 3 Weeks

$75 Serial Interface
$55 IEEE Interface

The world's first disposable print head.

That is the feature that will rank as "most updated" over the next few years.

The product of three long years of R&D, the MX-80 features many performance breakthroughs, including the world's first disposable print head. It's covered dot-by-dot at a full 50 to 100 million characters, but service is as simple as changing a ribbon cartridge. Snap the head out. Throw it away. Snap in a new one. It's that easy. The only tool you need is at the end of your arm. Anyone in your office can do it. And the replacement head costs less than 30 bucks. Think about service requirements. Mean Time To Repair. Downtime. This feature is a real breakthrough, and heralds an unprecedented level of serviceability and dependability in the office or home.

Correspondence quality printing.

A lot of printers claiming a lot more can't touch the MX-80's performance. It gives you a choice of 80, 40, 66 or 132 column of printing in as many as four distinct printing densities, a total of twelve different combinations in all, can accommodate nearly any printing requirement. More than half of these utilize multi-strike and or multi-pass techniques to generate "correspondence quality" printing. It's perfect for manuscripts, mailing labels, proposals and reports and other function where you need attractive, clean, clear, well-formed characters. So long as you're not trying to fool someone into thinking that you actually typed a document or letter, the MX-80 can handle nearly all of your text processing requirements.

A fully loaded printer at a bare bones price.

It's quite a machine. Bidirectional printing. Logical seeking of shortest lines. 80 CPS. 64 graphics characters. Forms handling. The list of standard features goes on and on. The fact is that there are few printers that can compete with the MX-80 at ANY price. And none — ZERO — in its outstanding, nearly affordable price range. Total performance coupled with Epson's legendary quality and reliability. The Epson MX-80. It's the printer you've always wanted.

```
NDEFGHIJKLMNOPQRSTUVWXYZ,/;  [@^]-1()=}~&'(
OPQ}~+*!{'?><ABCDEFGHIJKLMNOPQRSTUVWXYZ,./;:\[@^]-1234567890
abcdefghijklmnopqrstuvwxyz!  !"$%'(&'()=}~+*!{'?><ABCDEFGH
```

Flex User Notes

BY: RONALD W. ANDERSON
3540 STRUBRIDGE COURT
ANN ARBOR, MI 48105

THAT'S WHAT I GET

A few issues ago, I went and said something about the reliability of my SWTPC system. I should have known that that would be enough to invoke a super case of Murphy's law with all its associated corolaries. On about October 7, I finally received my new Qume Datatrack disk drives that I ordered on June 2. I spent some time getting things up and running, and on the following Saturday, was busy copying files and writing letters, when the system suddenly went dead. I wiggled and pokad at all the cards to no avail. After some couple of hours of thought, I decided to try a minimum system, ie., the processor board, one 8K memory board, and the terminal interface. Finally after some looking with an oscilloscope, I noticed that there was no activity on one of the data busses in the I/O section of the motherboard, which accounted for the lack of communication with the terminal. I had a few spare IC's and changed the DS8835 associated with the low order four bits of the data bus. Still no sign of response at the terminal, though the data bus was now showing activity. (When power up happens, the monitor comes up running, and tries to read an input from the terminal.) I finally noted that one of the data busses in the main section seemed to be "loaded", in that the voltage swing was not as large as the others. (That is, the pulses on that particular data line were smaller than the others.) I felt around with the back of a finger and found that the DS 8835 on my 6800 processor board was warmer than it should have been. It was removed, and by swapping with one from one of my memory boards, I suddenly had full size pulses on that bus, and I was communicating with the terminal again.

This was the most difficult phase of the "restoration" process. With the monitor working, I was able to try another memory board, etc. I found that a couple of other bus drivers on the memory cards were gone, and I began to realize what had happened. The data and address busses in a microcomputer system may be of the bi-directional type. Both are bi-directional in the SS-50 bus. The bus driver chips are of the bi-directional type. In response to a logic signal, they may be "senders" or "receivers". Normally, when the computer writes to memory, the processor board is the sender or driver, and the memory board that has been addressed is the receiver. When memory is read, the reverse is true. What had apparently happened, is that one of the drivers didn't respond to the logic signal and turn off. The result is like connecting the outputs of two generators together (or jumper starting a car and connecting the cables in reverse). A large current flows, and the "good" driver becomes bad too. The only cure for this disease is to change all the drivers at once, since one bad one will cause the others to fail again. I had enough OS 8835's from three memory boards to get two running. My two 16K boards from Digital Research had bad 74367's, but I managed to get enough from two boards to get one repaired in terms of the bus drivers. To my horror, these boards still didn't work. A Sunday afternoon of swaping 2114's found me 7 bad ones. The damage had gotten beyond the bus driver to the memory devices.

On Monday, I ordered some of the items locally, the 2114's from California after some price shopping in the magazines, and the 74LS640 for my 6809 processor which had died, and the 74LS245 for the DMAF, which didn't function either. I took some chance trying these boards briefly to see if they had life in them. Two days later, the local order arrived and I was able to get the memory boards up, less 4K for the bad 2114's. A week later, the SWTPC order arrived, and I replaced the drivers on the 6809 board and DMAF, both of which then worked immediately. The next day, the 2114's arrived and I found one more intermittent one and replaced it.

Now I had everything running again. Still, there seems to be a slight problem. A few months ago, I got the 6809 board and modified my system so that I could plug it in and switch the address decoding on the mother board and run it. As you might imagine, I need to run 6809 and 6800 software both, on my system for this column as well as for my work. I noticed a gradual increase of seemingly intermittent operation of the system. Often when I changed over, I had to wiggle cards a bit to get things going. I had been cleaning mother board pins with a rubber eraser now and then, but this didn't seem to help at all any more. I noticed black smudges on the spring contacts in the card edge connectors, and figured out that they can be cleened by inserting a round toothpick and rubbing. This didn't seem to help either. Finally in total desperation, I removed the mother board and turned it over to look for a cracked foil or some such. There was nothing at all wrong on the bottom of the board, but I held the board up to a light and noticed a thin black line down each connector pin where it is supposed to contact the card connector. The eraser didn't remove it, but a couple of swipes down each connector pin row with a piece of very fine sandpaper restored the silver appearance of the pins. I plugged the cards back in and have had no trouble since! I would like to know if anyone else has had similar problems. I had none until I started removing and plugging in boards regularly. Has anyone used a contact cleaner such as those sold for contacts on TV tuners or such with any success?

Well, anyway, I am back in business, and would like to thank SWTPC here for the super service in getting me the spare parts so fast. I haven't seen the 74LS640's listed anywhere in the catalogs, and the local TI distributor didn't have any in stock, though they had the 367's.

PASCAL FROM TSC

By the time you read this, TSC should have released their Pascal Compiler. It is to be a "native code" compiler and not a P-code compiler. By that, I mean that it will produce machine code directly, and not an intermediate code that runs through the use of a P-code interpreter. Dan Vanada of TSC informs me that it will have a full floating point capability, and implement the whole language as defined by Jensen and Wirth. I am anxiously awaiting a chance to try it out, and will report on it here in the future. My order will be in as soon as it is announced.

LEFT MARGINS ANYONE?

A month or so ago, I received a letter from John Deal in Florida, who asked me if I had ever thought of writing a utility to adjust the left margin when listing a BASIC program etc. He pointed out that the text processor works fine for formatting letters etc, but when an assembly listing is made, it prints too far to the left of the page to allow punching for insertion in a notebook. John realized that some printers allow moving the paper over to make this adjustment, but his doesn't allow this adjustment. By a very strange coincidence I received a letter from Francis Van Horn a couple of days later with a Print routine that has the Margin feature added. You will remember my mention of Francis in an earlier column. He pointed out to me that P.CMD and PRINT.SYS are not both required. All P.CMD does is to load PRINT.SYS and run the subroutine to initialize the port for the printer. I in fact published a print routine that was "all in one". Since then I have switched printers, and had to write a new set of drivers for my temporary Heath H14. I found it a lot easier to

interface with more than one printer and avoid difficulties with the print method in TSC BASIC, to stick to the two files. Additionally, with my new 8" drives I have enough sectors on the system disk that space is no longer a problem. 'Van' wrote that he had submitted the Margin, print routine to '68' Micro Journal in the Miniflex version, but that I should feel free to do up a FLEX2 and/or FLEX09 version. I am a bit lazy and didn't especially like Van's method of asking for the margin every time P, is used in a command line. I therefore did my version a little differently. You may take your choice. Although the version presented here is written to link with the 6809 FLEX, you may change the addresses of the FLEX linkages to those of FLEX2 and the programs will run. I have avoided using 6809 instructions, and in this way the same program will run in both simply by changing the FLEX Equates. My program, after outputting a character, jumps to a routine that checks to see if the character was a linefeed. If so, it inserts a number of spaces determined by a count stored in a location by another utility called MARGIN. If you forget to use the MARGIN utility, PRINT.SYS comes up with a value of 0. The margin, once set, remains at that value until you re-boot FLEX or otherwise destroy the print routines and have to re-load them. P.CMD, incidentally, checks to see if the PRINT.SYS file is loaded, and if it is, it is not reloaded when you use the P,LIST command, etc.

```
 NAM MARGIN
 TTL SET MARGIN FOR PRINTER
*
* THIS UTILITY STUFFS A NUMBER INTO A COUNTER IN THE
* PRINT.SYS ROUTINE, THAT WILL ADJUST A NUMBER OF
* SPACES TO BE OUTPUT AFTER A LINEFEED
*
* SYNTAX: MARGIN,7
*
* VALID MARGIN COUNTS 0-9 AND A-F. IE THE COUNT IS HEXADECIMAL
*
* EQUATES
GETHEX EQU $CD42
COUNT EQU $BE19
WARMS EQU $CD03
*
 ORG $C100
*
START BRA BEGIN
VN FCB 1
XTEMP RMB 2
BEGIN JSR GETHEX
 STX XTEMP
 LDAA XTEMP+1 LOW ORDER BYTE OF X
 STAA COUNT
 JMP WARMS
*
 END START
```

The print routine included here in PRINT.SYS is for a Heath H14 that I am using temporarily. I have it running at 4800 baud by means of a simple hardware handshake. The ACIA on the serial output board has two pins marked NOT CTS and NOT DCD. The NOT is indicated by a line over the CTS and DCD on the data sheets. CTS means Clear To Send, and DCD means Data Carrier Detected. Both must be low in order for the character in the ACIA transmit buffer to be sent. These pins 23 and 24 on the 6850 are connected to ground on the MP-S board but may be cut loose from ground and connected to the busy line from the printer. You can use the index position of the connector, or disconnect one of the TTY connections TO if you are not thinking of running a teletype on that port. The print routine illustrates the addition of the margin setting portion, and you may substitute your parallel printer routine. The only change in the output routine is the JSR MARGIN after outputting the character. Note that the character that has just been output must still be in the accumulator so that MARGIN may test for a linefeed. The Margin subroutine is added to the print file. It should be located near the very top of available memory in your system, and the overlay of MEMEND should correspond with the location before the start of this routine. You must do this part of the program and get the address of COUNT so you may use this address in the MARGIN utility.

Van wrote somewhat apologetically that he programs by sitting down at the terminal and starting to enter code. Van, and all, there's nothing wrong with writing short programs for your own use that way. I do a great deal of that at times. I am one of those who thinks that the time to do a flow chart is after the program is written. There is an middle ground that I think is more desirable than just starting to bang away, and that is to have a pretty good idea of what you are going to do in advance, and then break the program down into managable sized sections. You can do this by using subroutines or other means. Inserting blank lines after the end of a section of code is helpful in breaking up a long list of instructions into a more meaningful number of smaller "paragraphs". Comments are sometimes more a formality than a help. TSC used to supply source listings, and their favorite comment after an INX instruction was "BUMP THE POINTER". With all due respect to TSC, the comment doesn't say any more than the instruction, and a blank space there would provide some relief. LDAA followed by "LOAD THE ACCUMULATOR" does nothing to clarify the program. LDAA #7 GET THE BYTE COUNT, however, does convey some information. More useful than meaningless comments are labels that have some meaning, and a few lines of comments at the start of major subroutines that describe what the routine does, what is passed into it, and what is returned. You might have discovered that the subrotine MARGIN in my print routine here, results in what is called a "recursive" program. The user program calls POUT to print a character. POUT calls MARGIN to check for a linefeed. If a linefeed is found, MARGIN loads the A accumulator with $20 (a space), and calls POUT to output it. POUT outputs the space and calls MARGIN to see if a linefeed was output. Here the recursiveness stops, since the character is a space, MARGIN returns to POUT, POUT returns to MARGIN which decrements the space count and calls POUT again, etc. The program is recursive because A calls B which calls A which again calls B. Recursive programming is fine, and reduces the code required. It works as long as the recursiveness can't be infinite, that is, just like a loop, some condition must eventually become true, that will terminate the process. There is one other condition that must be guarded against. The machine Stack must save all the return addresses for all the calls, and there must be enough room for the stack to grow as far as necessary. In this case, the subroutine "nestng" only goes to a depth of 4. Some of my more involved Assembler programs that use a floating point math package exceed a depth of 14 or so. At any rate, it is an interesting and simple example of a recursive program.

```
                        *
                        * THIS UTILITY STUFFS A NUMBER INTO A COUNTER IN THE
                        * PRINT.SYS ROUTINE, THAT WILL ADJUST A NUMBER OF
                        * SPACES TO BE OUTPUT AFTER A LINEFEED
                        *
                        * SYNTAX: MARGIN,7
                        *
                        * VALID MARGIN COUNTS 0-9 AND A-F. IE THE COUNT IS HEXADECIMAL
                        *
                        * EQUATES
                CD42    GETHEX  EQU     $CD42
                BE19    COUNT   EQU     $BE19
                CD03    WARMS   EQU     $CD03
                        *
C100                            ORG     $C100
                        *
C100 20  03             START   BRA     BEGIN
C102 01                 VN      FCB     1
C103                    XTEMP   RMB     2
C105 BD  CD42           BEGIN   JSR     GETHEX
C108 BF  C103                   STX     XTEMP
C10B B6  C104                   LDAA    XTEMP+1   LOW ORDER BYTE OF :
C10E B7  BE19                   STAA    COUNT
C111 7E  CD03                   JMP     WARMS
                        *
                                END     START

0 ERROR(S) DETECTED

SYMBOL TABLE:

BEGIN  C105   COUNT  BE19   GETHEX CD42   START  C100   VN     C102
WARMS  CD03   XTEMP  C103
```

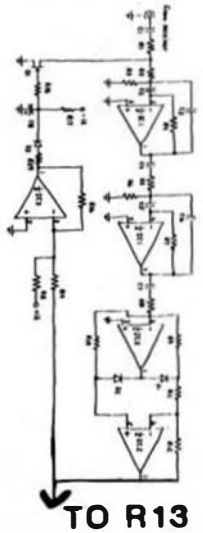
NOTICE

If you live in the vicinity of Vancouver, B.C. and are interested in exchanging names and addresses with fellow 68XX users, or would like to join the 68XX sub-group of the West Coast Computer Society (meets at B.C.I.T. in Burnaby at 8:00 pm on the first Wednesday of each month) write or call:

David C. Wiens
2261 East 11th Ave.
Vancouver, B.C.
Canada V5N 1Z7
Phone (604) 255-4485

NOTICE OF CORRECTION

On page 26 of the October issue of The 68' Micro Journal a reference to R13 on the schematic did not photocopy correctly rendering said schematic incomplete. The corrected schematic as it should have appeared with the article - "A MORSE CODE RECEIVING PROGRAM FOR THE 6800 MICRO" - by Terry L. Mayhugh is shown below.




```
                        *
                        *
                        * ACIA DRIVER FOR HEATH PRINTER ON PORT 0
                        * PRINTER 'BUSY' TIED TO ACIA HARDWARE HANDSHAKE
                        *
                E000    PORT0   EQU     $E000
                CC2B    MEMEND  EQU     $CC2B
                        *
CCC0                            ORG     $CCC0
                        *
CCC0 86  03             PINIT   LDA     #03       RESET ACIA
CCC2 B7  E000                   STA     PORT0
CCC5 86  15                     LDA     #$15      SET UP CONTROL BITS
CCC7 B7  E000                   STA     PORT0
CCCA 39                         RTS
                        *
                        * THIS IS THE END OF THE PRINTER READY CHECK
                        *
CCCB 35  02             FINCHK  PULS    A
CCCD 39                         RTS
                        *
                        * CHECK PRINTER READY
                        * SYSTEM REQUIRES "NEGATIVE" FLAG IN STATUS REGISTER SET IF
                        * READY.  THIS SHIFTS THE COMPLEMENTED STATUS TO THE SIGN BIT.
                        *
CCCE                            ORG     $CCCE
                        *
CCCE 34  02             PCHK    PSHS    A
CCD0 B6  E000                   LDA     PORT0
CCD3 43                         COMA
CCD4 48                         ASLA
CCD5 48                         ASLA
CCD6 48                         ASLA
CCD7 48                         ASLA
CCD8 20  E7                     BRA     FINCHK
                        *
                        * OUTPUT CHARACTER ROUTINE
                        *
C0E4                            ORG     $CCE4
                        *
CCE4 34  02             POUT    PSHS    A         SAVE ACCUMULATOR CONTENTS
 CE6 B6  E000           POUT1   LDA     PORT0
CCE9 85  02                     BITA    #02       TEST TRANSMIT BUFFER STATUS
CCEB 27  F9                     BEQ     POUT1     NOT READY. WAIT
CCED 35  02                     PULS    A         IF READY. GET CHARACTER TO OUTPUT
CCEF B7  E001                   STA     PORT0+1   OUTPUT IT
CCF2 BD  BE00                   JSR     MARGIN
CCF5 39                         RTS
                        *
                        * HERE IS THE COUNTER
                        *
BE00                            ORG     $BE00
                        *
BE00 81  0A             MARGIN  CMPA    #$0A      IS IT A LINEFEED?
BE02 26  14                     BNE     NOSPC     IF NOT, WE'RE DONE
BE04 7D  BE19                   TST     COUNT     TEST MARGIN COUNT
BE07 27  0F                     BEQ     NOSPC     IF ZERO, WE'RE DONE
BE09 34  04                     PSHS    B         SAVE B
BE0B F6  BE19                   LDAB    COUNT     GET COUNT
BE0E 86  20             LOOP    LDAA    #$20      SPACE
BE10 BD  CCE4                   JSR     POUT      PRINT IT
BE13 5A                         DECB              COUNT IT
BE14 26  FB                     BNE     LOOP      IF NOT ZERO, GO AROUND AGAIN
BE16 35  04                     PULB              RESTORE B
BE18 39                 NOSPC   RTS               ALL DONE
                        *
BE19 00                 COUNT   FCB     0         SET TO DEFAULT ZERO
                        *
CC2B                            ORG     MEMEND
CC2B BDFF                       FDB     $BDFF     PUT MEMEND BELOW THIS PATCH
                        * NOTE PATCH IS HERE BECAUSE USERS UTILITY RESIDES APP
                        * FROM BE40 TO BFFF
                        *
                        *
                                END

0 ERROR(S) DETECTED
```

Also find below the CBUG monitor listings mentioned in the January 81 issue of The 68' Micro Journal on page 15.

The Micro Works Monitor Tape for the Radio Shack Color Computer

This tape is a machine language program which is loaded with the "CLOADM" command. It loads at 0600 and is less than 2K long. After loading, the BASIC program in memory will consist of the single line "EXEC". Type in either "RUN" or "EXEC" to start the monitor. (Attempting to modify the BASIC program before doing this may have disasterous results.) When the monitor has started, it resets the BASIC buffer to start beyond the end of the monitor and clears it out, then types out a greeting line. It also resets the EXEC pointer to the warmstart address (which is 040C or 1036 decimal) so that future EXECs will not erase any BASIC program which may be in memory.

When the monitor issues its prompt, a single-letter command may be typed, along with any parameters needed. With the exceptions listed below, parameters are in hex and any non-hex character (such as backspace) will cause the command to abort and return to the monitor prompt level. Commands are shown as they appear on the screen, with spaces between the parameters, but these spaces are added by the monitor and should not be typed in by the user.

The following are the commands:

G Go back. Will return to BASIC unless the monitor was entered from some machine-language program. The registers, including the PC, are loaded from the register list as displayed by the R command. (See section on stack frame for more details.)

R Display register list. Shows what was in the registers when the monitor was entered, and what will be loaded by G or J commands. (See section on stack frame for more details.) The condition codes register is listed not in hex but in binary, as each of its bits has meaning. A letter indicates a one bit, and a dash a zero bit.

M Memory examine & change. "M 1 34" will display a line of eight bytes, with the cursor by address 1234. The cursor may be moved up, down, left, or right with the arrow keys (or the space bar) to display more memory. Typing hex numbers will enter data into memory. A carriage return will exit the command. Another "M" has the same effect as a carriage return followed by an "M".

This command is the primary tool for working with machine language.

I Insert hex to memory. "I 1234 2345 67" will set locations 1234 through 2345 (inclusive) to hex 67.

T Transfer block of memory. "T 0123 1234 2345" will copy the contents of locations 0123 through 1234 (inclusive) to the area of memory starting at 2345. Note that the format of both the "I" and "T" commands could be call "FROM - THRU - TO".

J Jump to machine-language subroutine. The registers CC, A, B, X, Y, and U are loaded out of the register list shown by the R command, and a JSR instruction is done to the location specified by the parameter. "J 1234" will jump to location 12 4, and if an RTS is encountered control will return to the monitor.

C Change register list. This is followed by a single-letter parameter which designates which register to change. Admissible register names are A, B, X, Y, U, D (direct page), C (condition codes), and P (program counter). This transfers control to the memory examine / change function ("M") at the address on the stack where the specified register is stored.

S Save to cassette. "S 1234 2345 1357 MYFILE" (followed by a carriage return) will write a file on cassette with the name MYFILE and containing the data from 1234 through 2345 inclusive. 1357 is the transfer address which is loaded into the EXEC pointer. The tape is loaded with BASIC's CLOADM command and if an EXEC is then done control will transfer to location 1357.

B Set baud rate. It is followed by a valid baud rate (0110, 0300, 0600, 1200, 2400, 4800, or 9600) and the single letter P or C. To use the comm link for upload/download or Auto mode, "C" should be used; "P" is for setting a baud rate for use with a printer under BASIC. (The baud rate may not exceed 2400 with the "P" option.)

L Load hex. This puts data into memory without the formatting done by the "M" command. "L 1234 23 45 67 89" and a carriage return to exit will set memory starting at 1 34 to the values 23, 45, 67, and 89.

@ Convert hex to decimal. "@ 1234" will print out 4660, which is the decimal equivalent.

. Convert decimal to hex. ".12345" (carriage return) prints out 3039, which is the hex equivalent. Unlike most parameters, the decimal number may be any number of digits (so long as the result fits in two bytes) and therefore must be terminated by a carriage return.

P Move display page. Any 512-byte block of ram may be displayed on the screen. Normally the block starting at 0400 is displayed. (Prove this to yourself by typing "L 0400 11 11 11 11" or something similar.) Ram type "P 0000". The upper left corner of the display will flash furiously, more on that in a second. Type carriage return, and the display will change abruptly. You are now actually looking at memory starting at location zero. You will notice one byte changing rapidly, this is the counter which keeps track of the color of the cursor. The monitor is running normally, but you just can't see the screen; if you're daring type "G" to return to BASIC and carry on while watching the variables. To restore order, type "P" again (while in the monitor) and the display will be back where it belongs (at 0400); now either type a carriage return or another address. If you want to watch the stack, type "P 3FFF" (or "P 0FFF" on a 4K machine).

To look at a particular byte of memory (say to watch a variable at location 1 34) type "P 1234" and note carefully the spot on the screen that is going nuts. When you hit return, that spot will display the variable.

U Upload. The baud rate should first be set (for example, "B 1200 C"). U 1234 2345 will send to the comm link and to the screen the contents of 1234 through 2345 inclusive, in Motorola's ch chksumed format.

D Download. The baud rate should first be set. If 9600 baud is used for download, there should be at least two stop bits (as with any software UART). Pressing any key on the keyboard will abort the operation. Data is expected on the comm link in the same format as it is dumped by Upload.

! Take over software interrupt. Until this command is executed, it is undefined what will happen if a SWI instruction (3F) is encountered by the 6809. This instruction sets the vector so that control will return to the monitor. Machine language debugging may then be accomplished by inserting SWIs into the program, at which point the monitor will be entered and the register contents dumped. At this point the registers may be changed ("C" command) or memory examined or altered, after which execution may be resumed at the point after the SWI by typing "G". An SWI may be put in place of an existing instruction in RAM and, upon its execution, the instruction put back and PC decremented by one before typing "G".

AU Auto mode. Once auto mode is entered, only a reset will remove it. The baud rate must have been set. Commands are entered not from the keyboard but from the comm link. The response from the monitor which normally goes to the screen is suppressed. All keypresses are sent on the comm link. This mode is useful for using the computer as an intelligent terminal connected to a host system.

The stack frame

When the monitor is entered, either from BASIC or a SWI (See the "!" command), the registers are saved on the stack. (When first entered, some registers may be changed first, but subsequent entries will not change anything.) This stack frame is what is displayed by the "R" command. The "G" command is really an RTI instruction, which automatically loads all the registers off the stack. The operation of the stack frame can be seen by typing "M" and then "J 0600". Type "M" again and the stack pointer will have decreased by 000C. This is because a new stack frame was made when the monitor was reentered. These may be changed by the "C" command. Now type "G". We are back in the monitor, but back to the first stack frame; any changes made to the register list are no longer there. Another "G" should return to BASIC. This is worth thinking about, anyway.

Offset loading

The monitor is written using all relocatable code, and may be offset loaded. This will reserve bytes from 0600 to the bottom of the monitor which neither BASIC nor the monitor will use. All references to absolute addresses in the 0600 area made in this document will have to be incremented by the offset amount.

Jump table

Jumps to various routines are included in the beginning of the monitor. References by programs should be made to these rather than into the body of the monitor code so as to insure compatibility with future releases. The jumps start at 0609 and take three bytes each, and jump to the following routines:

Hard start - resets BASIC buffer, then Firm start.
Firm start - builds stack fra e, clears Auto mode, warm start
Interrupt entry - assumes stack frame exists, dump registers and warm start
Warm start - save stack pointer and go execute commands
Inboth - looks for input from either keyboa d or comm link. Keyboard input will have bit 7 set, comm input bit 7 clear.
Inkey - Keyboard input. Returns with bit 7 clear.
Echo - Inkey, then Outey.
Outey - Output to screen. The control cha acters CR, LF, and BS are interpreted as they would be on a CRT.
RS232O - Output 8 bit byte to comm link.
RS232I - Input 8 bit byte from comm link.
Outhex - Print 2 digit hex number to screen. Number is found in location 0639. This is useful in BASIC: POKE 1587,X : EXEC 1575
Print data - Will print the data string (using Outey) whose address is in the X register. The operation is ended by a null in the string.
Out decimal - Prints the decimal value of the number in the D register (A:B) to the screen with left zero suppression. The value zero will produce no output.
Out2h - This prints a one byte hex value to the screen which is pointed at by X, incre enting X. It is the version of Outhex designed to be called by machine-language programs.

Variable table

The following variables are the only ones of interest to the user and therefore the only ones which can be counted upon for future compatibility.

param - 0633 - 1587 - the parameter to the Outhex function.

mode - 0634 - 1588 - If nonzero, the monitor will be in auto mode (under control of comm link).

upf - 0635 - 1589 - upload flag. If nonzero, Outey will also send to the comm link.

EPSON MX-80 REVIEW

JOHN TUCKER
Post Office Box 2898
Laredo, Texas
78041
October 25, 1980

Mr. Don Williams, Sr., Publisher
'68' Micro Journal
Post Office Box 849
Hixson, Tennessee 37343

Dear Don,

The following excited review is submitted for your consideration for publication and describes in far less than full detail the new Epson MX-80 Dot Matrix Printer. This review is being prepared (using none of the many available enhancements) on this printer.

It will be difficult to believe that the following describes one of the the least expensive Printers available today.

Physically, the printer is a little under 4 1/4" high, 14 3/4" wide, 12" deep, and weighs a mere 12 pounds. As is noted on this print-out, the character set is a 9x9 matrix and there are true descenders on the appropriate letters. A block of mixed-case text set on the printer is exceedingly readable as there are no ambiguities in the selection of character formation -- no mistaking a non-descending "g" for an "a", etc., as is the case in some available dot matrix fonts.

NOTE also that the printer has rather extensive graphic capabilities. (I am reviewing the Epson MX-80 Model II if you are interested in Graphics, write them for details on the Model 2 which is due to be released shortly. The Model 2 will have individual print-wire control abilities, micro-spacing both horizontal and vertical.) In my machine, the graphics may be turned off (internal DIP switch) and the Japanese syllabary enabled at the same time.

This review is being printed bidirectionally with the printer's usual logic enabled. Note that both margins are quite even without the ragged left (or right) margins left by some printers.

I am running this machine with an 8 bit parallel interface (directly from a good, old-fashioned SWTPCo MP-L card). The interface is Centronics style compatible -- in fact, I simply copied a cord that Gary Nachter of San Antonio uses to interface his MBI computer to a Centronics printer via a SWTPCo MP-L card. Optional interfaces are RS232 and IEEE 488.

Internal logic in the machine includes an 8049 CPU with 2K on-chip ROM, 4K of external ROM, and some appropriate support chips.

NOW WE COME TO THE GOODIES! Reliability! The print head has an expected life of from 50 to 100 million characters. AND the print head can be changed WITH NO TOOLS, just your fingers. AT A COST OF $20.00 retail. Read that line again and believe it. The print head seems to be very well constructed and is contained in a generous heat sink. Mean Time Between Failures of the machine, other than the print head, is conservatively rated at 5 million lines. (If the machine totally self-destructed somewhere at the low end of the expected MTBF, you would still have paid only about 1/100 of a cent per line printed, depending on the retail "deal" you had made.)

The ribbon is a large cartridge, extremely easy to install, that sells for around $12.00, retail. It is a literal snap to change; my first time to install one was measured in seconds.

Don, you cannot spare the room for the full run-down of the many, many features of this printer; compressed print (16.5 characters per inch); normal print (10 CPI); compressed expanded print (8.25 CPI); expanded print (5 CPI); boldface abilities, etc. for a total of about a dozen methods of printing, all under software control. Horizontal AND vertical tabs plus form feeds and line feeds are standard features. There are three line spacings available under software control, too.

The print rate from a parallel interface is 80 CPS and a throughput ranges from 105 LPM at 20 characters per line to 46 LPM at 80 characters per line. Printing is very quiet (almost silent when compared with the IBM my unit replaced).

Paper handling is by adjustable tractor-type pin feed with the easiest adjustments ever found on a printer. Up to 3 part forms may be accomodated with thickness adjustment a simple little lever to be toggled by one finger. Paper may range from 4" to 10" and is fed through a very clever, simple, maintenence free separator system so that incoming paper is not pulled under paper being output from the machine. The loading and eject paths are conveniently from the rear.

The machine is so light and runs with essentially no vibration or "thumps and bumps" because of the bidirectional printing system. Almost any desk or furniture item is suitable for support.

There are simple lights and indicators for all functions: Power On; Printer Ready; Paper Out; On Line. The printer goes Off Line and sounds a (pleasant tone'd) buzzer intermittently for about thirty seconds under a Paper Out condition. Switches are provided for Power On/Off; On/Off Line; Form Feed; and Line Feed. The latter two will operate only in an Off Line condition to prevent spoiling print-outs.

A well written forty page instruction book is included with the machine. It takes all forty pages to disclose such things as:

DIP switch selection of character sets for:
- U.S.A.
- France
- Germany
- England
- Japanese syllabary

DIP switch selection of 22 options via 12 switches

It is impossible not to wax enthusiastic over the Epson MX-80 printer, especially after having discovered that Epson America is in the process of setting up nationwide distribution, dealerships, AND repair centers. Several long conversations with their people left me feeling that they really do "give a darn" about the customer's satisfaction and his repair needs. The costs they quoted on repairs indicated that they don't intend to get rich on this part of their business!

It is Epson's stated policy to make this one of the lowest, if not the lowest, priced printers on the market and yet to attain a high performance standard. By next issue time I'll be able to tell you how it handled a 1,200 page solid text print-out. If it takes that without blowing to bits, it will have done better than my IBM has ever done.

I happily recommend this printer to the attention of the readers of the '68' Micro Journal.

Note: This review was photo reduced - these few lines are output from an Epson MX-80 printer, which has turned out to be a fine printer, by our lab checks also.

DMW

Dear Don,

I promised to write and tell you how the Epson MX-80 printer held up under the load of printing a super-long file. The run has just finished. It consisted of a draft of some novels. The format was 65 characters per line, 27 printed lines per page (double spaced), each page titled and numbered and identified with the author's name -- standard format for submission except in this case the author wanted to see it with both margins justified in order to get a rough idea of how it would look in print. Because of the author's style, we estimated a 90% line fill. Thus, there were 1,580 characters per page. The file ran 1,382 pages. My "How to Type in 3,000 Easy Lessons" manual says to figure 5 characters per word. This would be a total of 436,712 words.

You are reading an output from the same ribbon that was used to run the file, and it is still set for a fairly light impression stroke. We can find no sign of needed maintenance on the machine. Indeed, the machine looks new since we've vacuumed out the little round "dots" of paper from some imperfectly punched tractor feed holes.

Now, if we can find a Text Processor that doesn't work our disk drives so badly, we'll be extremely happy. Our TSC Text Processor for miniFlex makes a disk read for (approximately) each two lines printed on the page. That means that the drives never stop running during a print-out and that the heads are loaded and unloaded thousands upon thousands of times during long runs. (Shugart, we love you!) Has anyone ever heard of a Text Processor that will read an entire file (or a big chunk of it) into memory and process out of RAM rather than directly off of disk? I would surely be interested in one like that -- if it ran in miniFlex.

By the way, in two years I have blown an M6800 chip on both an MP-A and an MP-A2 card. I have only lost one other chip in the entire system, which is fairly loaded. The other chip was an output chip on a serial interface card. It didn't like the idea of driving a 20 mil loop for another printer so it just resigned from its job. (I run the Epson MX-80 from an MP-L parallel card.) Can anyone suggest the reason for losing the M6800's?

Appended is a little list of handy routines to keep next to the terminal when using the Epson MX-80. (The Fill Memory With Zeroes is for those days when you turn on the computer and the disk doesn't want to boot; it's a modification of a routine from a back issue of The Journal.)

I hope the holiday's were pleasant for everyone.

Happy computing,

John

John Tucker

```
FILL MEMORY WITH ZEROES
    MO000
        0000 86 00
        0002 BE FF FF
        0005 36
        0006 20 FD
    J0000
    [RESET]
DOUBLE WIDE PRINTING (ONE LINE)
    HECHO 0E, or
    CHR$(14) from Basic, or
    .DW from Text Editor or Processor
COMPRESSED PRINTING (UNTIL CANCELLED)
    HECHO 0F, or
    CHR$(15) from Basic
CANCEL COMPRESSED PRINTING
    HECHO 12, or
    CHR$(18) from Basic
SET TO 8 LINES PER INCH
    HECHO 1B,30, or
    CHR$(27),CHR$(48) from Basic
RETURN TO 6 LINES PER INCH
    HECHO 1B,32, or
    CHR$(27),CHR$(32) from Basic
OTHER ENHANCEMENTS AVAILABLE
SEE INSTRUCTION BOOK
```

6809 PERFORMANCE TIMINGS

Performance Timings for the 6809

In the March 80 issue of BYTE James R. Lewis published a number of measured timings for TRS-80 levels I and II and for an IBM 370/148 (Ref. 1). It triggered my curiosity - how would my own computer fare on that same test? I have an SWTP C/09 computer: 56K memory, 1Mhz 6809, a CT-82 and a DMAF-2. I decided to run Mr. Lewis's test both in BASIC and assembler, and compare my timings with those stated in his article.

The temptation of knowing how the 6809 processor compares with the 370/148 was big. I also wanted to get a better feel for the new features on the 6809 architecture, specially those related to auto-relocating programming. I took Mr. Lewis' original program (it is a 14-line BASIC program to compute all prime numbers from 1 to 10000, see listing 1) and run it. It took 4h 17 minutes, quite an improvement over the TRS-80 level II 6h 31 minutes stated by Lewis, but I must confess I had expected TSC Basic to be faster than that. I then wrote an assembler version of the program (see listing 2) using auto-relocation techniques. It ran in 6 minutes and 50 seconds, which is again much superior to the original Basic version. I then rewrote the same program in assembler but using direct addressing as much as possible. The execution time decreased to 6 minutes and 10 seconds, a 10% improvement over the autorelocating version.

The table below compares the 6809 timings with the TRS-80 and IBM 370/148 timings obtained by Lewis:

1.	TRS-80 Level II Basic	:	6h 31min 10sec
2.	Z80 assembler	:	22min 50sec
3.	6809 Basic (TSC Basic)	:	4h 17min 10sec
4.	6809 assembler autoreloc.:		6min 10sec
5.	6809 assembler direct	:	6min 10sec
6.	IBM 370/148 assembler	:	56sec

The TRS-80 and IBM timings are from Lewis. I also inhibited all output in the assembler routines to make sure I wasn't measuring terminal i/o time - I got 6min 45sec for the autorelocating program (listing 2) and 6min 3sec for the direct program (listing 3), which shows that virtually all terminal output is overlapped with actual programming.

I also ran the test using Lucidata Pascal. The program can be seen in listing 4. It took 2h 50min, which is a substantial improvement over BASIC. I then replaced the remainder computations (REPEAT statement in listing 4) with REPEAT X:= m mod k, using the built in mod function - the time dropped to 2h 16min!

There are some interesting conclusions: while coding in assembler gives an improvement factor of 37 in the SWTP, it only improves the TRS-80 timings by 20. Does that mean that the TRS-80 Basic uses the Z80 better than TSC Basic uses the 6809? There is no fancy programming involved in Listing 2 or Listing 3: it took me one evening to do both, and I never came back to try to optimize any of the programs. The 6809 is only about 6-7 times slower than the 370/148 processor, which is a comforting result if you look at the prices. The 6809 is 3.3 times faster than a TRS-80 in this test - I was really hoping to see a larger number than that. And it seems that Lucidata Pascal is a winner, at least in this sort of compute bound application.

Anyone to run the same tests on an SL.00 machine?

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England

1. TRS-80 Performance Evaluation by Program Timing - James R. Lewis - BYTE, April 80.

Listing 1: Prime Number Generator from Lewis' article

```
30      PRINT "LIST OF PRIME NUMBERS"
40      PRINT
50      PRINT 1;2;3;
55      C=0
70      M=5
80      M=M+2
90      FOR K=3 to M/2 step K-1
100     IF INT (M/K)*K-M=0 then 190
110     NEXT K
121     PRINT M;
122     C=C+1
190     IF M< 10000 THEN 80
195     PRINT " C = ";C
200     END
```

Listing 2: Prime Number Generator in 6809 Assembler using autorelocating techniques

```
* program to compute prime numbers - autorelocating version
*
*
* general equates follow
*
patmg   equ     $CD1E           . print string routine
outch   equ     $CD0F           . output a character
outdec  equ     $CD39           . output a decimal number
rentry  equ     $CD03           . DOS entry point
lim     equ     10000           . maximum of all numbers
*
* the following equates define local variables within the system stack
*
m       equ     0               . current prime-to.be
k       equ     2               . loop index
m2      equ     4               . m/2 for acceleration purposes
tpequ   6       .               size of local variable area in stack
*
* following are some messages for printing
*

HDR     fcc     'list of prime numbers:1 2 3 '
        fdb     $0A, $0A
MSG     fcc     'C = '
        fdb     $07, $07
        fdb     $04, $0A
*
* initialize
*
primes  leas    -tp,s           . reserves space for local variables
        leay    hdr,pcr         . point to header message
        jsr     patmg           . ask FLEX to print it out
        ldy     #0              . clear y (count of prime numbers)
        leax    3,y             . x=3=mecurrent candidate to prime
        stx     m,s             . m=3
*
* major loop starts here
*
top     ldu     #3              . u=k=3=loop count
        stu     k,s             .
        leax    2,x             . m=m+2
        stx     m,s             .
        tfr     x,d             . move m ( in x register) to d register
        lsra                    .
        rorb                    . and divide it by 2
        addd    #1              .
        std     m2,s            . becoming m2

* minor loop starts here
loop    tfr     x,d             . prepare to comput remainder
inner   subd    k,s             . compute remainder or m/k
        bge     inner           .
        addd    k,s             .
        beq     bot             . if remainder=0 number is not prime
        leau    2,u             . else let us try next divisor
        stu     k,s             .
        cmpu    m2,s            . if k  m/2
        blo     loop            . then try next divisor
        leax    m,s             . else number is prime
        jsr     outdec          . ask FLEX to print it
        leay    1,y             . and bump number of primes
*
*this is the bottom of the major loop
*
bot     ldx     m,s             . if m =10000
        cmpx    #lim            .
        blo     top             . then do the major loop again
        leax    msg,pcr         . else prepare to print last msg
        jsr     patmg           . and ask FLEX to do it
        sty     m,s             . point to the total of primes
        leax    m,s             .
        jsr     outdec          . and print it
        leas    tp,s            . restore stack to its primitive location
        jmp     rentry          . and go back to DOS
        end     primes
```

Listing 3: Prime Number Generator in 6809 Assembler using Direct Addressing

```
* program to compute prime numbers - non autorelocatable version
*
```

```
pstring  equ     $CD1E           . print a string routine
outch    equ     $CD0F           . output a character routine
outdec   equ     $CD39           . output a decimal number routine
rentry   equ     $CD03           . reentry point into DOS
lim      equ     10000           . maximum prime nbr
*
* data division starts here
*
k        fdb     0               . loop count
m        fdb     0               . prime-to-be
m2       fdb     0               . m/2
*
HDR      fcc     'list of prime numbers: 1 2 3'
         fdb     $04, $04
MSG      fcc     'c = '
         fdb     $07, $07
         fdb     $04, $04
*
* procedure division starts here
*
primes   ldx     #hdr            . point to hdr msg
         jsr     pstrng          . print it
         ldy     #0              . count=0
         leax    3,y             . x register=3
         stx     m               . m=3
* top of outer loop
top      ldu     #3              . u=3
         stu     k               . k=3
         leax    2,x             . m=m+2
         stx     m               .
         tfr     x,d             . m2=m/2
         lsra                    .
         rorb                    .
         add     #1              .
         std     m2              .
* top of inner loop
loop     tfr     x,d             . prepare to compute remainder
inner    subd    k               . compute remainder of m/k
         bge     inner           .
         addd    k               .
         beq     bot             . exit if not prime
         leau    2,u             . bump loop count
         stu     k               .
         cmpu    m2              . if k  m/2
         ble     loop            . then reloop
         ldx     #m              . point to number
         jsr     outdec          . go print
         leay    1,y             . bump pointer

bot      ldx     m                       . if m  10000
         cmpx    #lim            .
         blo     top             . then repeat outer loop
         ldx     #msg            . else prepare msg with total
         jsr     pstrng          .
         sty     m               .
         ldx     #m              .
         jsr     outdec          . and print it
         jmp     rentry          . return to DOS
         end primes
```

Listing 4: Primes Generator written in Pascal

```
program timings     ;

const np = 10000 ;
var

        X,Z : integer ;

        C,M : integer ;

         k  : integer ;

begin

            writeln ;

            write (' list of prime numbers: 1 2 3 ') ;

            C : = 0 ;

            m : = 3 ;

            while m<np do begin m: = m + 2 ;
                                k: = 3  ;
                                x: = 1  ;
                                repeat x:= (m/k)*k-m;
                                       k:= k+2
                                until (k>m div 2 or (x=0);
                                if x=0 then begin write (m);
                                                  c: = c+1
                                                  end;

                                end;


            writeln ;
            write ('C =, 'C) ;
            end.
```

Clock Speed Adjustment

for the

SWTPC MP6800-A2 Processor

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When the SWTPC microcomputer is used with a floppy disk system the processor speed becomes quite critical. The instructions furnished by SWTPC suggest that the user check the processor speed and adjust the values of resistor R1 and capacitor C1 (see Figure 1A) so as to obtain a processor speed of 1.0 MHz (or at least a speed within the range 900 KHz to 1.05 MHz). Percom in its instructions furnished with their LFD-400™ disk system suggest that the capacitor C1 be replaced with a 4 MHz crystal (with a 32 pf capacitor in parallel) and resistor R1 be replaced with a jumper wire (see Figure 1B). They suggested this modification since the circuit shown in Figure 1A is temperature sensitive.

While Percom's modification allowed us to use their disk drives, we found its operation was not entirely reliable. The output of the clock circuit was not clean (see Figure 2) and sometimes it would oscillate at twice the desired frequency

The simple modification shown in Figure 1C gives more reliable results. Since it is not recommended to tune an XTAL with a parallel capacitor due to loading and lowering the Q of the XTAL, we replaced resistor R1 with a tank circuit tuned to 4 MHz to ensure operation at the desired 1.0 MHz frequency. As is the case of the Percom circuit we also replaced capacitor C1 with a 4 MHz crystal. Figure 3 shows the output of our clock circuit. We have been using it on two microcomputers (both using Percom's LFD-400™ disks) for almost a year and have had no detectable problems. We have never observed the clock circuit to oscillate at other than the desired frequency.

Figure 4 shows the components of the circuit in Figure 1C in place on the MP6800-A2 board. The Capacitor C1 is not visible since it was soldered on the back of the board.

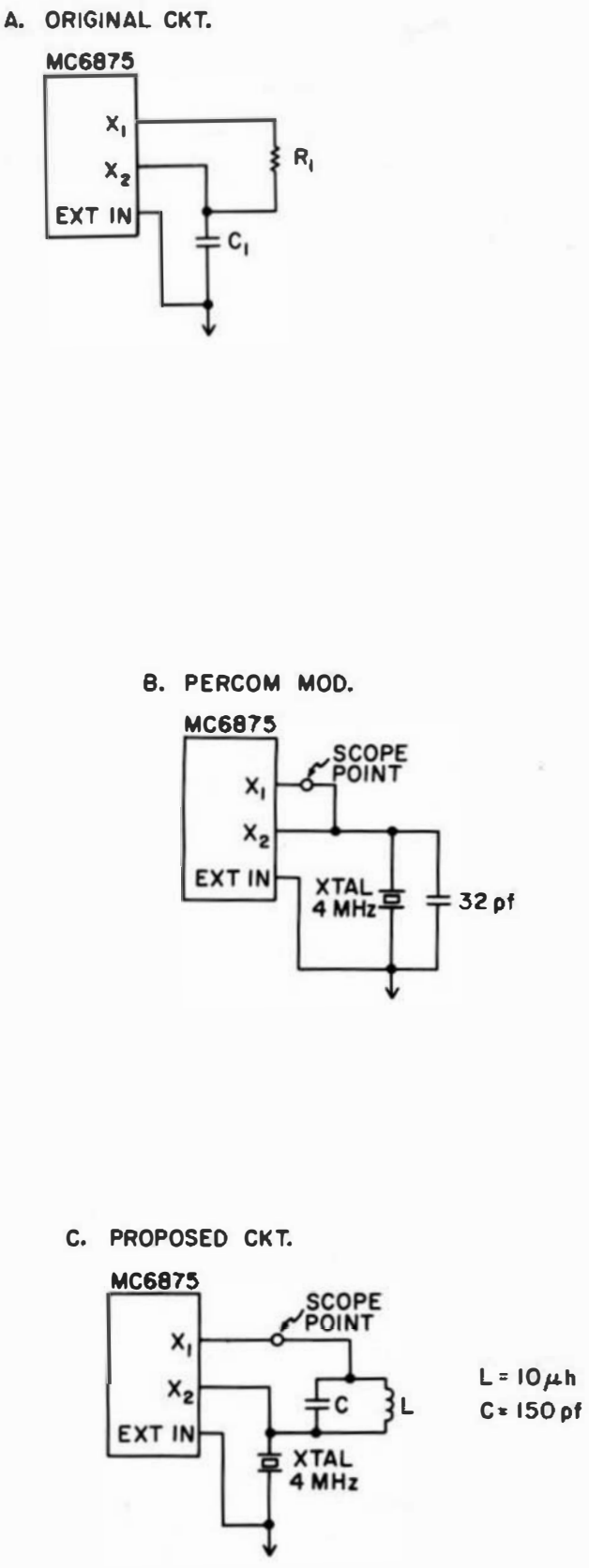


Figure 1. Clock circuits for SWTPC MP6800-A2 processor. A. SWTPC circuit. B. Percom modified circuit. and C. a proposed circuit.

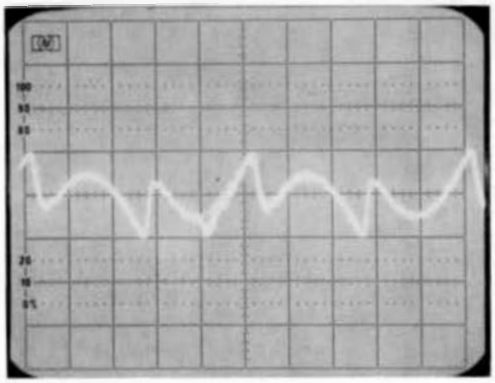


Figure 2. Oscilloscope trace of output of the circuit shown in Figure 1B recorded from the "scope point" shown in Figure 1B.

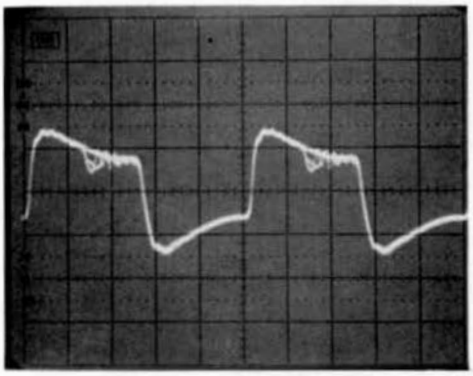


Figure 3. Oscilloscope trace of output of the circuit shown in Figure 1C recorded from the "scope point" shown in Figure 1C.

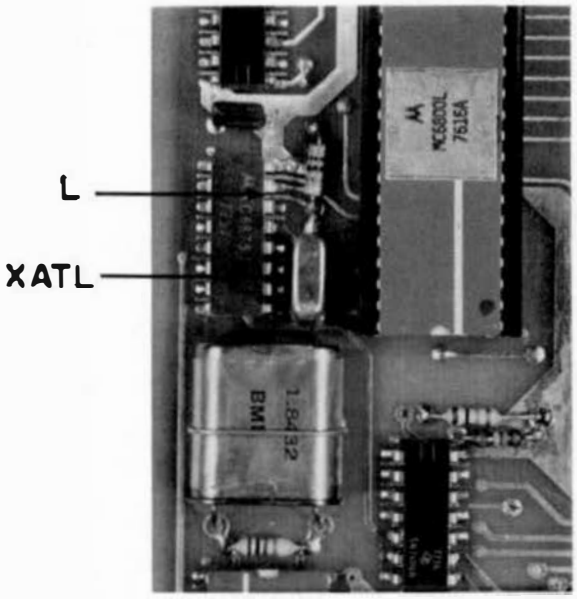


Figure 4. Photograph of part of the top of a SWTPC MP6800-A2 board showing the modification required to implement the circuit shown in Figure 1C.

6809 SUBROUTINE INTERFACE

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1. Introduction

This article presents my views on what should be a standard for 6809 programming. The aspect that I will discuss is stack frame management. This concept is sometimes referred to as a calling convention. It deals with how arguments are passed to subroutines, how automatic, private static, and global static variables are allocated and referenced, how registers are saved, and how the stacks are manipulated.

2. Ritter - Boney Scheme

In their excellent series of articles in the January - March, 1979 Byte Magazines on the 6809 Ritter and Boney show on pages 40 and 42 how a typical high level language might use the hardware stack pointer, s, and user stack, u, for calling subroutines. Their scheme has the advantages of being interruptible, reentrant, and relocatable. Reentrant means that a routine could be interrupted at any point in its operation and be reentered from a different path, executed, and return to the original set of data and continue processing without error. For example, take an interrupt servicing routine which processes two ACIAs, one running at 1200 BAUD and the other at 9600 BAUD. Suppose an interrupt came in from the slower device requesting the output of the next available character in the buffer. When it is half way through its task, an interrupt comes in from the faster device. The slow task is pushed down and the fast device is serviced. Upon return from the second interrupt the slow device's service is completed and the first interrupt is returned. Obviously the entire interrupt servicing routine should take a whole lot less than 1 msec. or we'd never get anything else done. Reentrancy requires that the routine not modify any static variables. One way to avoid static variables is to pass the work area in as a parameter which could be a function of the interrupt handling routine, or the routine can use an area at the end of the stack.

The stack layout is interruptible because the s register is never allowed to wander. It is always kept pointing to the last used byte.

Relocatability is provided by never using a 16 bit absolute address. Every reference to a memory location is indexed from some register or passed in to the called routine by a higher level routine. In a disk based system user managed overlays now become trivial to implement.

3. Advantages of This Method

In addition to the good things about interruptibility, reentrancy, and relocatability my layout has at least three advantages to that scheme. In theirs arguments are passed to subroutines using the method named "call by reference." Instead of passing the argument to the routine the address of the actual argument is passed. I use "call by value" which passes a copy of the argument. This enables every routine to be recursive, a very handy feature if you know how to handle it. Calling by address has two other problems. The first is that if two instances of a routine are passed the same argument by address and the routine modifies that argument, then reentrancy is destroyed. Subtle bugs of this kind are among the hardest to detect because your program may run for hours or days and then mysteriously bomb. Second if constants are passed to a routine which expects a variable and then if the routine tries to modify it, it may be trying to write ROM. In this stack frame layout the u register is always in a fixed place with respect to the calling routine's saved status. Thus a debugger which knows about this layout can do all sorts of marvelous things.

Finally, I push my arguments on the stack in reverse order to their declaration in the calling routine. This may seem like a silly thing to do, but now we can write utility subroutines which don't know ahead of time how many arguments they will be called with. The printf function alluded to in the hanoi program below is an excellent example. It gets its number of arguments from the %x keywords in the format string. Alternatively either an argument

count can be passed as the first argument or preferentially an end of list flag consisting of an illegal value to the routine.

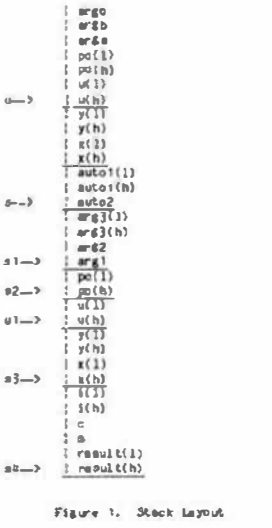


Figure 1. Stack Layout

```
        call( subr, arg1, arg2, auto1 )
        ldd     auto1   ; push arg1
        psha    d       ; from
        lda     arg2    ; right
        psha    a       ; to
        lda     arg1    ; left
        psha    a       ; a has become s1
        lbsr    subr    ; s1—>s2
        leas    4,s     ; restore stack
```

Figure 2. Calling Program

```
subr    proc(
*               char(arg1),
*               char(arg2),
*               int(arg3)
*       )
subr    equ     *
        psha    x,y,u   ; s2—>s3
        leau    0,s     ; u—>u1
*       auto(
*               int(i),
*               char(c),
*               char(a),
*               int(result)
*       )
        leas    -6,s    ; s3—>s4
        . . .
*       ldd     arg2
        ldx     5,u     ; reference arg2
        . . .
*       return(result)
        ldd     -10,u   ; load result
        leas    6,s     ; restore automatics
        puls    x,y,u,pc; return
```

Figure 3. Called Program

4. How it Works

This section will describe in detail what goes on during a call to a subroutine and the return.

There are three accompanying Figures, numbers 1, 2, and 3. Figure 1 is a pictorial of the stack layout with high addresses on top and lower addresses on bottom. Figures 2 and 3 are code fragments from a calling and called routine respectively. The commented lines are what a programmer would write, or the equivalent, when supported be a suitable macro package. Following each comment line is the macro expansion. In the comment fields of the appropriate lines are indications of the transitions of the u and s registers which can be referred back to Figure 1.

4.1 Argument Passing

As mentioned earlier I pass my arguments by value in the reverse order to that in which they are declared in the call. The prime reason is that this allows for variable length argument lists to be passed to subroutines. In the example, however, this feature is not exercised. Each argument is loaded into an appropriately sized register, the a for byte length arguments and the d for integers, and then pushed onto the stack. One small failing of the 6809 is that it is not truly a two address machine. For example you can't say:

```
mov     10(u),--sp
```

as you can in a true two address architecture.

4.2 Pointer Manipulation

The most difficult thing to understand is how the s and u registers are manipulated. The s register is simply moved downward during the call and then rapidly restored upward upon return. It is restored in two steps because of the who knows what problem. The caller knows how many arguments were passed, and the called knows how much automatic storage was obtained. The stack pointer is never let to wander. It is always firmly anchored at the lowest byte used; thus an interrupt can come at any time and sanity is preserved.

The u register is always pointing at the high order byte of the caller's u register. This keeps a fixed relationship for debugging. Ritter and Boney point the u register at the base of the automatic variables which I feel is wrong.

To preserve the sanity of the stack, manipulation of the s and u registers must be left to the macro package. Sending the u register off to point to never never land just to save a load or a store is false economy.

In my first draft, I had the u register pointing at the last saved register. Then I realized that the macro package could easily be modified to provide for an optional user parameter for the registers saved if I placed the u register pointing at the high order byte of the old u without loss of generality. My original coding was:

Ritter said that the lea instruction would be handy.

4.3 Saved Registers

I only save the x, y, u, and pc registers and not the whole bunch which could include the dp, cc, and a and b or d. The a register surely and most likely the b register will be clobbered by either the call or the return. Indeed the 6809 with

its single 16 bit accumulator has a bottleneck here. The accumulator must be considered a scratch register.

The dp register should never be manipulated by a user program and need not be saved. I don't agree with the practice of using the cc register to return information to the caller. This is another tough debugging situation and not a good structured technique. The test or arithmetic operation should be tightly linked visually to any branch on condition that depends on it.

4.4 Returned Values

Values returned by functions can be either characters, integers, or pointers. They will be loaded into the d register if integers or pointers or into the a register if characters. Some valid discussion may be made that these character length values should be returned in the d register after being loaded into the b register and sign extended.

4.5 Variables

Variables have two aspects aside from being characters, integers, strings, etc. These are their scope and lifetimes. Scope represents just who knows about what and by what name. A variable is local if it is known only within its defining routine. It is global if every routine in the whole program can access that variable directly. Locals are the safest to use. Debugging programs with lots of interacting globals is a nightmare. Most microcomputerists probably don't know any better having only BASIC and rudimentary assemblers to work with; they probably just wonder why programming is so hard to get right.

The second aspect concerns lifetime. Automatic variables are created at each entry into a routine and destroyed upon return. It is the programmer's responsibility to ensure that they are initialized at each entry because they will almost always contain garbage. When a routine is exited the space reserved is returned and can be reused by other routines. Static variables on the other hand exist throughout the life of the main program. If you set a static and return, when you come back in it will still retain its previous value, unless some other routine has clobbered it that is.

4.5.1 Globals Globals are to be avoided if possible. In many cases they just invite bad programming practices. On the other hand, they can be very necessary. The address of an I/O control block is a good example of a commonly used global. This will allow writing on the output device from anywhere in the program. I don't mean to stuff characters down an ACIA but to have some agreed upon value to pass to a system I/O routine asking it to do the actual work.

I recommend that the 6809's dp register be used for global access. This gives 256 bytes of storage which can be referenced with short instructions. This might not seem like a whole lot considering the size of a FLEX FCB, but remember I said to place the pointer there not the data.

4.5.2 Automatics Automatic variables are taken off the stack by moving the stack pointer down by the required amount as the last operation in the entry code. In the examples I show an auto macro which defines the automatic variable area. There are three kinds of automatics ints, chars, and ptrs. Each has its sub-macro which assigns automatically an offset of the u register and adds its length to the amount to be reserved. When the auto macro exits it generates the stack pointer move instruction.

4.5.3 Statics As is the case for automatic variables there is a static macro. I haven't worked out the exact details for this, but it probably should assign initialized values to an area of address space which will become ROM, if that's what you are doing, and uninitialized ones to RAM. Addressing would be program counter relative.

4.5.4 Treatment of Arrays What to do with arrays? These are tough; I don't think that they should be assigned to the stack because they take up just too much room. I would prefer that a system level allocate/free entry be available which manages memory. That way arrays can be treated as a pointer to an array. Definitely arrays should not be passed around as arguments in a machine with an 8 bit data bus.

5. Recursion

I present as an example not only of recursion but as a tour-de-force for this method the famous "Towers of Hanoi" problem. This states that there are three needles on one of which there is a series of disks of steadily decreasing size. The objective is to move the disks from the first tower, t1, to the second, t2, using the third, t3 as intermediate storage. Only one disk can be moved at a time and at no time can a larger disk be placed on a smaller.

The recursive solution is to move n - 1 disks from the first to the third using the second tower as storage. Then the largest disk can simply be moved to the second tower. Finally move the n - 1 disks from the third to the second using the first as storage. The only other thing to do is to place at the top of the routine a stopping point for when n becomes zero, 0. The routine is presented in Figure 4 just as it would be written using my stack layout supported of course by a suitable macro package. A driver routine containing a line of the form:

```
call( hanoi, 5, 'a', 'b', 'c' )
```

is also required.

6. Debugging

One of the things we seem to spend so much time on as assembly level microprocessor programmers is debugging. If a program bombs for some reason, one of the nicest things to know is just how you got to where you were. A very simple debugger can be written which not only tells you how you got there by tracing the u register, but it can also tell you the values of your arguments and automatic variables. Unless a good convention is followed, this is not possible.

This convention insures that when a program goes haywire and must be postmortem debugged the u register is in the same place with respect to the old u and pc. A general debugger will not have any a priori knowledge of how many arguments there were, how much automatic storage was obtained, what manipulations of the s the programmer has done, nor even what portion of a call if any was going on.

One possible debugging feature of a macro package is a compile time debug option. If this flag is turned on, several things can happen. First, stack growth would be checked on every subroutine entry against a limit stored by the operating system in the direct page. Also, the programmer can sprinkle special debug and assertion macros around which are activated by the debug flag. Debug macros dynamically display values and assertion macros test states of the program and error out if false. In a production program these statements are left in the source and

```
hanoi   proc(
                int(n),
                char(t1),
                char(t2),
                char(t3)
        )
        auto(
                int(n_min_1)
        )
        static(
                str( format, "move %d from %c to %c\n" )
        )
        ldd     n
        beq     hanoi9
        dec     d
        std     n_min_1
        call( hanoi, n_min_1, t1, t3, t2 )
        call( printf, format, n, t1, t2 )
        call( hanoi, n_min_1, t3, t2, t1 )
hanoi9  return()
        end
```

Figure 4. Towers of Hanoi

generate nothing in the object.

7. Implementation

I've mentioned in several places that a macro package would be a convenience for using an interface standard. In fact the standard is quite complicated and off-by-one errors are extremely likely if used by hand. Programmers are a lazy lot in many instances and the objective in managing them is to make it easier to follow the standard than to violate it.

The macro language in which the package is implemented will have to be quite powerful. It will require recursion in order to implement the variable length argument lists of the call and proc macros. In addition preprocessor, a synonym for macro processor, variables are necessary for passing offsets and types around to various macros. The auto and int macros set up the storage class, size, and offset of a name. These values are later used in call macros to determine which register to index from and by how much as well as whether to use a lda or ldd instruction to prepare for the pshs.

8. Conclusions

I've tried to spark some discussion of what is a very important topic in programming. Some will say that efficiency is lacking in these standards. I reply that a nonworking program is the most inefficient thing there is. These standards provide isolation of one module from another. Many programmers will tell you that their systems are modular, but if you look carefully you'll find out that what they have coded up is a lot of modules, not a modular system. An enhanced assembler can be a very powerful and productive language. Note that in the hanoi example the programmer coded up 21 statements of which 4 were strict assembler. These would expand into approximately 47 instructions. These decisions are among the first, after selection of the implementation language, that must be made at the beginning of a software project. This is what I'm doing personally. I'm setting up my standards, getting together my toolkit, and steeling my nerves to trade in my SWTP 6800 and miniFLEX for a brand new SWTP 6809 system.

2 CPU ONE SYSTEM

Put the 6800 and 6809 together on the S350 bus - and select with a switch which one you want to operate

I own a SWTPC computer system with 40Kb RAM, Minifloppy Disk System, CT-82 Terminal, Anadex DP8100 Printer and a Gailhead Typewriter.

The software I use has a broad range - all TSC programs, f.ex. Ed Smith the SMITHBUG monitor Macroassembler and Sourcegenerator (very usefull), the BASIC compiler from Software Dynamics (very good, but only for larger programs), Microware's ASBASIC compiler and interpreter (good for standalone applications) and Homeworks STRUBAL+ (after some tries I put it in the deepest drawer of my desk).

When I received the MP-09 CPU board, the first action I took was : I replaced the SBUG monitor by an E/PROM modified for a physical I/O address of $8000, for use in the non modified SWTPC computer.

Next I booted the FLEX9 DOS. When it run I was really surprised, because the 8Kb RAM board was jumpered to address $A000-$BFFF and FLEX9 needs RAM in the range $C000 - $DFFF. After source connecting and playing with STAT I found out that SBUG places after Power UP ALWAYS 8Kb RAM to address $C000 by the Dynamic Address Translator and then arranges all other RAM (in 4Kb blocks) continuously from address $0000 up. e.g. If you have a 32Kb RAM board at address $4000, 8Kb at address $A000 and 4Kb at address $F000, the 4Kb board will be placed by the DAT immediately behind the 32Kb board (at address $8000).

Then after exchanging several times the two CPU boards, I looked for a method to place both CPU boards together on the S350 bus and select them by switch. I needed a weekend to investigate the possibility and to do the modification. Afterwards it points out, that only a few modifications have to be done to the CPU- and motherboard. The modification to the motherboard is only necessary if you want to use the original SBUG monitor what also means you can put up to 32Kb RAM into the computer (Fig.1).

Now an explanation of the actual modification. The basic idea was to put the not used CPU into the HALT state, like for a DMA application. That's the only drawback I can see of this modification: that you can't use DMA, e.g. for a DMA Floppy Disk System.

Most of the output signals to the bus are already prepared to be floated by an HALT signal. The only exceptions are the RESET and CLOCK B line. An other thing to take care of is that the RESET, HALT, BA and BAUD RATE lines does not interfere. Following I describe all necessary and optional hardware changes:

1. CPU board MP - A2 (SWTPC)

1.1. Floating of RESET and the CLOCK B2 (Fig. 2)
Cut the trace from pin15 of IC11 to ground (component side) and connect it to pin1 of IC11 (solder side).

1.2. Disable the data bus driver in the HALT state. (Fig. 3)
Cut the trace from pin12 of IC17 and 18 to pin8 of IC9 (component side) and connect it to pin2 of IC17 and 18 (comp.side).

1.3. Remove the MASTER RESET line from the bus because the MP-09 use this line for MEMORY READY. (Fig. 2)
Cut the trace of the M.RESET signal between C9 and the 50pin connector(comp.side) and solder at C9 a one pin connector (comp.side). A wire from this connector is routed together with the RESET wire from the MP-09 board to the switch at the frontpanel.

1.4. Exchange the 150b with 9600b (optional). (Fig. 2)
Cut the trace from pin11 of IC18 to pin8 of IC4 (comp.side) and solid it to pin1 of IC4 (solder side). The baudrate signals of the MP-A2 are used, these on the MP-09 are disabled.

2. CPU board MP-09 (SWTPC)

2.1. Floating of RESET and CLOCK E (Fig. 4)
Cut the trace from pin19 of IC23 to ground (solder side) and connect it to pin1 of IC23 (solder side).

2.2. Remove the HALT line from the bus, because it is used by the MP-A2 and easier to modify on the MP-09. (Fig. 5)
Cut the trace from pin40 of IC14 to the bus connector just below R11 (comp.side) and connect this point with a wire to the NMI ground pin (comp.side). Then cut the trace between the NMI and RESET pin (solder side). I think it is enough to have one Ground pin for all signals together (HALT,NMI,RESET).

2.3. Disable the signals BA and BAUD RATE.
Just remove (or cut it only to one pin) the jumpers for BA/BA=BS and B2/B3.

2.4. Solder a resistor of about 1KOhm from the FIRQ and MEMORY READY line to +5V to prevent unpredictable problems.

On the MP-09 there are a few more signals connected to the bus than on the MP-A2, but they don't interfere, with one exception:
1. The BUS STATUS is on B1, not used by the MP-A2
2. B is on UD1
3. FIRQ is on UD2
4. MEMORY READY is on M.RESET, this has to been modified on the MP-A2.

3. Motherboard MP-B or MP-B2 (Fig. 6 and 7)
This change is only necessary if you want to have the I/O address for the MP-09 at $E000.

3.1. Switching the I/O address from $8000 to $E000 and vice versa.
MP-B :Cut the trace from pin11 of IC6 (solder side) and solder three wires to a) pin11 of IC6 (solder side) b) pin7 of IC6 (solder side) c) pin12 of IC5 (solder side). The wires should be long enough for to mount an additional dual pole toggle switch at the front panel.
MP-B2:Cut the trace from pin13 of IC6 and solder three wires to a) pin13 of IC6 b) pin9 of IC6 c) pin12 of IC5.

3.2. Narrow the I/O address space down to 2Kb.
MP-B :Deliver pin5 and 6 of IC5 (solder side). Solder pin5 of IC5 to address line A12 (solder side: pin4 of IC5 to A11 (solder side) and pin1 of IC5 to pin6 of IC6 (solder side).
MP-B2:Cut the trace from pin4 of IC6 (solder side) and connect pin4 of IC6 to A11 (solder side).

4. Wiring (Fig. 8)

4.1. Install a dual pole toggle switch to the front panel and connect the wires from the motherboard and the HALT lines (see figure).

4.2. Cut the wire from the RESET switch to the motherboard and connect it with the RESET wires of both CPU's.

Now install both CPU boards on the bus and switch on power. One monitor should appear. If not, check all wirings. One possibility for an error is the wiring of the new switch (I for myself did it the first time hi). In case of troubles the best is to check with an oszilliscope all busline for abnormal signals especially the CLOCK line. When operating you can toggle the switch while power on. It is only necessary to RESET afterwards the RESET switch.

Now good luck with your modification and enjoy your 6809.

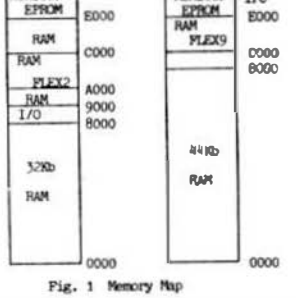


Fig. 1 Memory Map

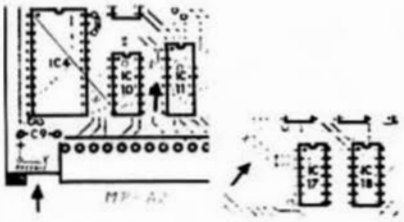


Fig. 2 Fig. 3

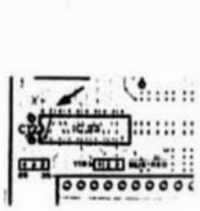


Fig. 4

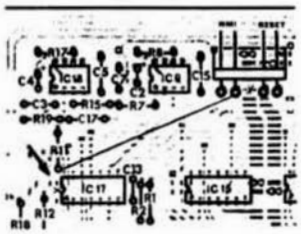
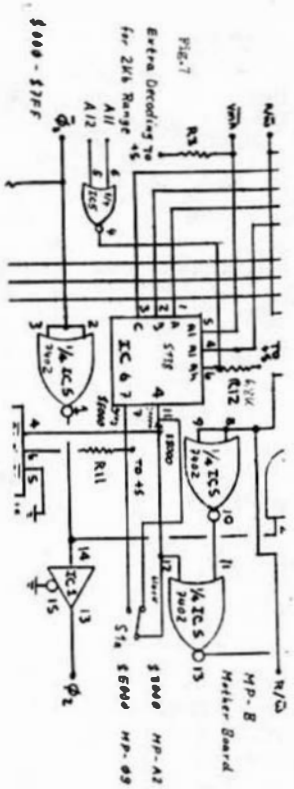
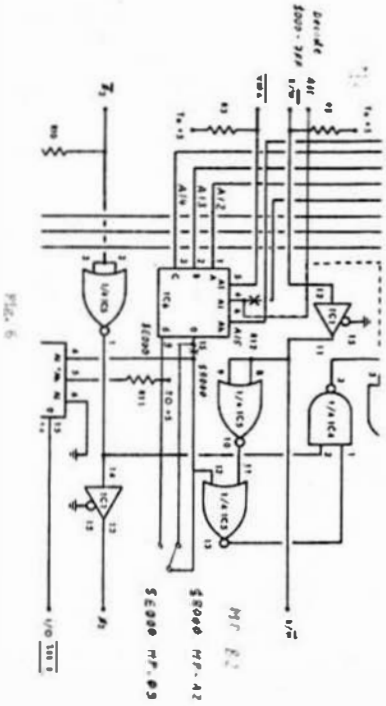


Fig. 5





RUDOLF REUTER 10/82
DRUSUSSTR 62
6200 WIESBADEN
W. GERMANY

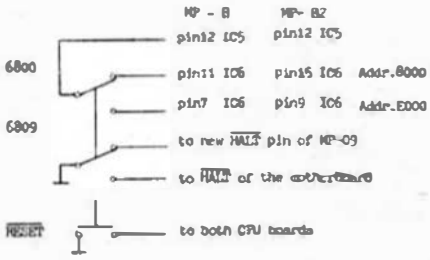


Fig. 8

LIFE CYCLES

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Thousand Oaks, Ca.
91362

One of the more visible movements in our society has been to an increasing awareness in biorhythms. Yet, the authenticity and scientific foundation is somewhat questionable. One area which has not received interest is the subject of Cyclic Law which does have scientific foundation. Everything you can see,hear,or touch is subject to Cyclic Law. The earth revolves on its axis every twenty four hours, creating day and night. The earth travels around the sun every 365¼ days and results in rhythmic seasonal changes. Trees grow large from small seeds, then wither and die. Everything in the universe and indeed, the universe itself, lives

and moves in accordance to Cyclic Law.

We humans have our own cycles, but unlike the universe and the trees, we can control to a large degree the what and when of our own existence through evaluation of these cycles. We need not be the slaves to fate, so start now to live in harmony with the Laws of Cycles. The following program will start you out and guide you into the right direction.

We are all faced with daily decisions. The man in his business, the woman in the home, the child in school find themselves face to face with problems which could have various affects on their futures. As people decide, so will they determine their fate and establish their destiny.

Everything in the world, has a cyclic existence of its own. This not only refers to men and the universe, but also to corporations, disease, and even ideas and emotions. All have a distinct starting point, a definite rhythm of its own. These cycles are like a line drawn out for various length and divided throughout their duration into equal segments.

Medical science, biologists, and physiologists agree that human life is divided into a progression of cycles of seven years each. From birth to an age of seven, there is a cycle of self discovery in which the growing child learns his relationship to the world and how to adjust to this world. The next cycle from seven to fourteen affects the physical growth and muscular control. The third cycle is one of mental and physical growth and the fourth is one of growing spiritual awareness. The fifth is a creative cycle and so on.

Most cycles have seven divisions, like the seven days of the week or the seven notes in a musical octave. There are also cycles of three, four, and twelve cycles, although those of seven are most frequent.

Just as a human life is divided into cycles of seven years, so is each year of life divided into seven cycles of about fifty-two days, and each one of these cycles provide you with different possibilities, opportunities to be grasped or problems to be reconciled with. The calendar year has nothing to do with this cycle. This is your life cycle. It extends from the day of your birthday in one year to the day before your next birthday.

The attached program is self prompting and easy to use. The program works with either basic or extended basic, and requires 48k of memory for the extended basic. Lines 310 and 545 provide the output to be directed to a line printer if a program called "print.sys" resides on disk 1. Lines 520 and 540 change the print size on my Heath H11 printer. Since this program deals in rounded numbers and a day cannot be divided into a partial day, there will be a one day difference between the last day of the seventh cycle and the birthdate.

For those individuals not willing to input this rather large program, I will provide a 5¼ disk ver. Flex 9.0 containing the complete lifecycle program and a biorhythm program which takes leap years into account, to produce monthly biorhythm charts. I will provide this disk for $9.95. Forward requests to the above address and I would enjoy corresponding to persons who have found correlations to the charts. As a sidelight, I used the startup date of my computer system to run the cycles and found that a failure occured in the seventh cycle, coincidence?

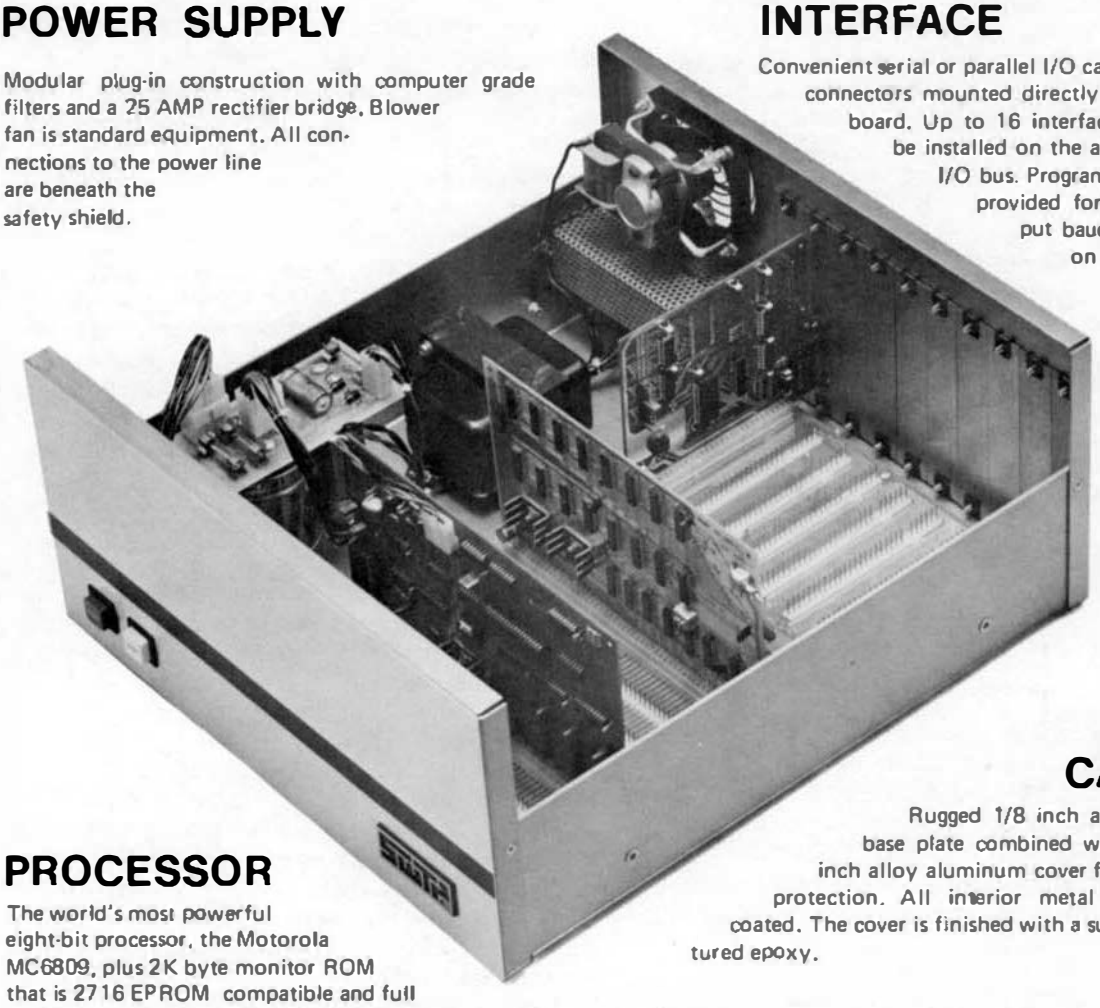
WE HAVE A 6809 FOR YOU

POWER SUPPLY

Modular plug-in construction with computer grade filters and a 25 AMP rectifier bridge. Blower fan is standard equipment. All connections to the power line are beneath the safety shield.

INTERFACE

Convenient serial or parallel I/O cards have DB-25 connectors mounted directly on the circuit board. Up to 16 interface devices may be installed on the address decoded I/O bus. Programming strips are provided for input and output baud rate selection on each port. All outputs are fully buffered.



CABINET

Rugged 1/8 inch alloy aluminum base plate combined with a solid 1/8 inch alloy aluminum cover for unsurpassed protection. All interior metal is conversion coated. The cover is finished with a super tough textured epoxy.

PROCESSOR

The world's most powerful eight-bit processor, the Motorola MC6809, plus 2K byte monitor ROM that is 2716 EPROM compatible and full buffering on all output lines. Built-in multiuser capability, just add I/O cards to operate a multi-terminal system.

MEMORY— You can purchase the computer with either 8K bytes of RAM memory (expandable to 56K), or with the full 56K. The efficient, cool running dynamic memory used in this system is designed and manufactured for us by "Motorola Memory Systems Inc."

PERIPHERALS—The wide range of peripheral hardware that is supported by the 6809 includes: dot matrix printers (both 80 and 132 column), IBM Electronic 50 typewriter, daisy wheel printers, 5-inch floppy disk system, 8-inch floppy disk systems and a 16 megabyte hard disk.

SOFTWARE— The amount of software support available for the 6809 is incredible when you consider that it was first introduced in June, 1979. In addition to the FLEX9 operating system, we have a Text Editor, Mnemonic Assembler, Debug, Sort-Merge, BASIC, Extended BASIC, MultiUser BASIC, FORTRAN, PASCAL and PILOT.

69/K Computer Kit with 8K bytes of memory . . . . . $ 495.00
69/A Assembled Computer with 8K bytes of memory . . . . . $ 595.00
69/56 Assembled Computer with 56K bytes of memory. $1,595.00

SWTPC

SOUTHWEST TECHNICAL PRODUCTS CORPORATION
219 W. RHAPSODY
SAN ANTONIO, TEXAS 78216 (512) 344-0241

6809 DISK SYSTEMS

All disk systems are supplied with our version of FLEX 9, the world standard disk operating system for the 6809. Our systems normally operate in double density format, but they are compatible with single density, or single sided recording formats. FLEX is supplied with over forty utilities, many of which are only available with our systems.

Our disk systems offer you mass storage at low cost. The cost per thousand bytes of storage for our various systems is shown in the chart. Other 6809 disk systems have costs up to three times greater for the same general type drive.

TYPE	CAPACITY	COST
D-5	720,000 bytes	$1.80 per/K
DT-5	1,400,000 bytes	$1.16 per/K
DMF-2	2,400,000 bytes	$1.04 per/K
CDS-1	16,000,000 bytes	$ .27 per/K

D-5 Two double sided, double density, 5" disk drives with a total on line capacity of 720,000 bytes of data. Includes cabinet, power supply, connecting cable and controller. Controller will operate up to four drives. This is an ideal disk system for small stand alone word processing systems, or for businesses that do not work with large inventories.

14 x 6 x 10 – 20 lbs $1,295.00



D-5 or DT-5

DT-5 Double track density version of the D-5. The DT-5 uses two 96 track per inch drives to provide an on line capacity of 1,400,000 bytes. Includes cabinet, power supply, connecting cable and controller. Controller will operate up to four drives. This is a disk system with enough capacity to include small inventories of up to 1,000 items, plus the usual business package of general ledger payroll, etc.

14 x 6 x 10 – 20 lbs $1,695.00



DMF2

DMF-2 Double sided, double density, dual eight-inch disk system with an on line capacity of 2,400,000 bytes. Our "top of the line" disk system features a DMA type controller for fastest possible data transfers. This drive was designed for larger businesses and multi user installations. The DMF-2 will provide the fast operation necessary for systems running multiterminals under the UniFLEX operating system. Complete with a heavy duty 1/8-inch metal cabinet, power supply, connecting cable and controller. The controller will operate up to four drives.

17½ x 5 x 21½ – 53 lbs $2,495.00

CDS-1 This "Winchester" type hard disk provides both large storage capacity and high speed operation. The CDS-1 is the answer for systems that must handle large inventories or systems with more than four terminals. The controller has its own processor and uses DMA data transfer.

CDS-1 – 115 lbs $4,395.00



CDS-1

SWTPC

SOUTHWEST TECHNICAL PRODUCTS CORPORATION
219 W. RHAPSODY
SAN ANTONIO, TEXAS 78216 (512) 344-0241

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LIFECYCLES - CALCULATIONS OF CYCLIC LAW


10 REM*************************************************
20 REM*                                               *
30 REM*          LIFE CYCLE PLOTTING ROUTINE          *
40 REM*                        BY                     *
50 REM*                              MARK WILKINS     *
60 REM*                              2863 KENTRIDGE DR*
70 REM*                              THOUSAND OAKS, CA*
80 REM*                                    91362      *
90 REM*                                               *
100 REM*************************************************
110 DIM F(12),Z#(25),T#(8)
120 DATA 31,28,31,30,31,30,31,31,30,31,30,31
130 DATA "FIRST","SECOND","THIRD","FOURTH","FIFTH","SIXTH","SEVENTH"
140 READ F(1),F(2),F(3),F(4),F(5),F(6),F(7),F(8),F(9),F(10),F(11),F(12)
150 READ T#(1),T#(2),T#(3),T#(4),T#(5),T#(6),T#(7)
160 REM INPUT DATA INTO PROGRAM
170 INPUT "ENTER CURRENT DATE (MM.DD:YY)";M3,D3,Y3
180 PRIN
190 INPUT "ENTER YOUR NAME";Z#
200 PRINT
210 INPUT "ENTER BIRTHDATE IN Format MM.DD";M1,D1
220 PRINT
230 INPUT "ENTER YEAR FOR WHICH THE CHART IS DESIRED IN FORMAT YYYY";Y1
240 REM CONSIDER LEAP YEARS MAKE FEBRUARY EITHER 28 OR 29 DAYS
250 C=Y1
260 GOSUB 592
270 F(2)=F(2)+C
280 IF M3<=M1 THEN 290 ELSE 320
290 REM
300 Y1=Y1+1
310 OPEN "[.PRINT.SYS" AS 0
320 PRINT #0, "LIFE CYCLE CHART FOR ";Z#
330 PRINT #0,:PRINT #0,:PRINT #0,
340 LET A=1:LET T=1
350 FOR T= 1 TO 7
360 PRINT #0, T#(A);" PERIOD LIFE CYCLE:"
370 REM ADD CONSTANT TO BIRTHDATE AND PRINT
380 LET A=A+1
390 X=M1
400 LET P=(F(X))-D1
410 X=X+1
420 IF X>12 THEN X=1
430 LET P=(F(X))+P
440 IF P>52 THEN 480
450 IF P<52 THEN 410
460 IF P>52 THEN 470
470 P=P-51
480 LET D2= (F(X))-P
490 LET M=X
500 PRINT #0,TAB(35);M1;"/";D1;" TO ";M3;"/";D3 + 2
510 LET D1=D2:?:LET M1=M2
515 REM CHANGE PRINT SIZE ON PRINTER
520 PR[=T #0, CHR$(27);CHR$(117);CHR$(32)
530 ON T GOSUB 600,1600,2600,3600,4600,5600,6600

540 PRINT #0, CHR$(27);CHR$(117);CHR$(1):PRINT #0,:PRINT #0,
545 CLOSE 0
550 NEXT T
560 INPUT "ANOTHER CHART";A$
570 IF LEFT$(A$,1)="Y" THEN 190
580 INPUT "JUMP TO BIORHYTHM";B$
590 IF B$="Y" THEN CHAIN "BIO.BAS"
591 END
592 REM LEAP YEAR ROUTINE
593 IF C-400-INT(C/400)=0 THEN 598
594 IF C-100-INT(C/100)=0 THEN 670
595 IF C-4-INT(C/4)=0 THEN 670
596 C=0
597 RETURN
598 C=1
599 RETURN
600 REM FIRST CYCLE
610 PRINT #0,"THIS IS THE CYCLE OF OPPORTUNITY.  IT IS THE BEST TIME TO"
620 PRINT #0,"ADVANCE YOUR INTERESTS WITH OTHERS WHO MAY HAVE THE POWER AND"
630 PRINT #0,"INFLUENCE TO HELP YOU.  THIS IS THE TIME TO ASK FAVORS, TO SEEK"
640 PRINT #0,"EMPLOYMENT OR LOANS OR BUSINESS CONCESSIONS. TO FORM PARTNER-"
650 PRINT #0,"SHIPS OR TO MAKE INVESTMENTS.  THIS IS ALSO A GOOD TIME TO "
660 PRINT #0,"ADVANCE YOURSELF AMONG THE PEOPLE OF YOUR CITY, STATE OR COUNTRY"
670 PRINT #0,"TO BUILD UP YOUR CREDIT STANDING OR YOUR REPUTATION.  THIS IS"
680 PRINT #0,"THE BEST TIME FOR YOU TO PUSH YOURSELF FORWARD WITH DETERMIN-"
690 PRINT #0,"ATION SO FAR AS YOUR NAME, YOUR INTEGRITY AND YOUR HONOR ARE"
700 PRINT #0,"CONCERNED."
720 RETURN
1600 REM SECOND CYCLE
1610 PRINT #0,"THE SECOND CYCLE IS DISTINCTLY DIFFERENT.  IT IS THE BEST "
1620 PRINT #0,"TIME TO PLAN SHORT JOURNEYS OR TRIPS OF IMMEDIATE IMPORTANCE."
1630 PRINT #0,"IT IS ALSO AN EXCELLENT TIME FOR ADVING ABOUT, IF THAT SHOULD"
1640 PRINT #0,"BE NECESSARY.  IN OTHER WORDS THIS IS A CYCLE PROPITIOUS FOR"
1650 PRINT #0,"CHANGES THAT CAN BE STARTED AND FINISHED WITHIN THE CYCLE "
1660 PRINT #0,"ITSELF.  IN A BUSINESS WAY IT IS A GOOD CYCLE FOR ADVERTISE-"
1670 PRINT #0,"THINGS SUCH AS FREIGHT, CARGOES, AUTOMOBILES, TRAINS, PUBLIC"
1680 PRINT #0,"CONVEYANCES, OR EVEN PUBLIC LECTURES OR PERFORMANCES WHICH "
1690 PRINT #0,"MAY MOVE FROM PLACE TO PLACE.  IT ALSO PRESENTS EXCELLENT"
1695 PRINT #0," CHEMICALS, GASOLINE, OIL & OTHER PRODUCTS OF THIS CHARACTER."
1700 PRINT #0,"OPPORTUNITIES FOR THOSE WHO DEAL WITH LIQUIDS, MILK, WATER,"
1710 PRINT #0,"CHEMICALS, GASOLINE, OIL AND OTHER PRODUCTS OF THIS CHARACTER."
1720 PRINT #0,"DEALING WITH PEOPLE WHO ARE IN BUSINESSES ASSOCIATED WITH THE"
1730 PRINT #0,"FOREGOING WILL BE MORE SUCCESSFUL AT THIS TIME THAN AT ANY"
1740 PRINT #0,"OTHER.  THIS IS ALSO A VERY GOOD CYCLE FOR BUSINESSES WHICH"
1750 PRINT #0,"CATER TO TRANSIENTS SUCH AS HOTELS, RESTAURANTS, CAR RENTALS"
1760 PRINT #0,"AND SIMILAR SERVICES.  HOWEVER, ONE SHOULD NOT PLAN A CHANGE OF"
1770 PRINT #0,"BUSINESS OR START A NEW CAREER OR MAKE ANY PERMANENT CHANGE"
1780 PRINT #0,"DURING THIS CYCLE, AND CONTRACTS AND OTHER ARRANGEMENTS THAT"
1790 PRINT #0,"ARE INTENDED TO LAST A LONG TIME SHOULD NOT BE ENTERED INTO."
1800 PRINT #0,"IT IS AN UNFAVORABLE CYCLE TO BORROW OR LEND MONEY AND IT IS"
1810 PRINT #0,"NOT GOOD FOR STARTING THE CONSTRUCTION OF A BUILDING OR "
1820 PRINT #0,"ENTERING UPON A PROJECT THAT REQUIRES A SUBSTANTIAL INVESTMENT."
1830 PRINT #0,"CERTAINLY IT IS A MOST UNFAVORABLE CYCLE TO SPECULATE IN THE "
1840 PRINT #0,"STOCK MARKET OR TO GAMBLE IN ANY FORM."
1860 RETURN
2600 REM THIRD CYCLE
2610 PRINT #0,"THIS CYCLE REQUIRES THAT YOU EXERCISE DISCRIMINATION AND GOOD"
2620 PRINT #0,"JUDGMENT.  IT USUALLY BRINGS A GREAT INFLOW OF ENERGY WHICH"
2630 PRINT #0,"MAKES YOU WANT TO DO GREAT AND IMPORTANT THINGS.  IF DIRECTED"
2640 PRINT #0,"CAREFULLY THIS CAN BE THE BEST TIME IN THE YEAR TO IMPROVE YOUR"
2650 PRINT #0,"HEALTH OR BUILD UP YOUR BUSINESS OR DO ANYTHING THAT REQUIRES"
2660 PRINT #0,"THE EXPENDITURE OF ENERGY.  HOWEVER, GOOD JUDGMENT IS NEEDED."
2670 PRINT #0,"YOU WILL BE TEMPTED TO UNDERTAKE PROJECTS WHICH HAVE NO "
2680 PRINT #0,"POSSIBILITY OF SUCCESS OR WHICH MAY TAKE SO LONG TO DEVELOP"
2690 PRINT #0,"THAT YOU WILL HAVE TO ABANDON THEM BEFORE COMPLETION.  BUT THIS"
2700 PRINT #0,"IS A GREAT TIME TO TACKLE AND OVERCOME OBSTACLES THAT HAVE "
2710 PRINT #0,"BLOCKED PROGRESS IN THE PAST.  TO MAKE A STRONG SECOND EFFORT TO"
2720 PRINT #0,"SOLVE PROBLEMS EARLIER ABANDONED BECAUSE OF LACK OF ENERGY.  IT"
2730 PRINT #0,"IS A GREAT TIME FOR DEALING WITH THINGS THAT REQUIRE GREAT "
2740 PRINT #0,"ENERGY SUCH AS IRON AND STEEL, ELECTRICAL MACHINERY, CUTLERY,"
2750 PRINT #0,"SHARP INSTRUMENTS AND FIRE.  IT IS ALSO A PARTICULARLY GOOD"
2760 PRINT #0,"CYCLE TO OPPOSE COMPETITORS OR DEAL WITH ENEMIES WHO HAVE"
2770 PRINT #0,"HERETOFORE BEEN OBSTACLES IN YOUR PATH.  IT IS AN UNFAVORABLE"
2780 PRINT #0,"CYCLE FOR MEN OR WOMEN TO TRY TO DEAL WITH WOMEN BUT ON THE"
2790 PRINT #0,"OTHER HAND IT IS AN EXCELLENT CYCLE FOR WOMEN TO ATTEMPT TO "
2800 PRINT #0,"MEN WHEN DESIRING FAVORS OR PREFERMENT OR AID IN BUSINESS OR"
2810 PRINT #0,"SOCIAL MATTERS.  ARGUMENTS AND STRIFE SHOULD BE AVOIDED BECAUSE"
2820 PRINT #0,"THE OUTCOME IS VERY APT TO BE BAD.  BUT IF YOU HAVE SOMETHING"
2830 PRINT #0,"TO SELL WHICH CAN BE PUT ACROSS IN ONE FORCEFUL INTERVIEW, THIS"
2840 PRINT #0,"IS THE BEST CYCLE."
2860 RETURN
3600 REM FOURTH CYCLE
3610 PRINT #0,"IN THIS CYCLE THE MENTAL AND SPIRITUAL NATURE IS STIMULATED."
3620 PRINT #0,"IT IS THUS AN EXCELLENT CYCLE FOR WRITING BOOKS, PRODUCING"
3630 PRINT #0,"PLAYS, MAKING PLANS, FOR ALL MATTERS REQUIRING IMAGINATION"
3640 PRINT #0,"AND QUICK THINKING AND THE ABILITY TO EXPRESS YOUR THOUGHTS"
3650 PRINT #0,"LUCIDLY.  YOUR MIND WILL BE FILLED WITH NEW IDEAS WHICH WILL"
3660 PRINT #0,"COME VERY RAPIDLY, SO IT IS IMPORTANT THAT YOU GRASP THEM "
3670 PRINT #0,"QUICKLY AND PUT THEM INTO PRACTICE BEFORE THEY ARE FORGOTTEN"
3680 PRINT #0,"OR PUSHED ASIDE BY THE NEW THOUGHTS WHICH WILL CROWD UPON THEIR"
3690 PRINT #0,"HEELS.  IT IS THEREFORE A GOOD CYCLE TO ACT ON IMPULSE OR "
3700 PRINT #0,"HUNCHES.  YOU WILL BE OPTIMISTIC IN THIS CYCLE BUT SOMEWHAT"
3710 PRINT #0,"NERVOUS AND RESTLESS. WHICH IS TO BE EXPECTED WITH YOUR IMAGIN-"
3720 PRINT #0,"ATION HIGHLY CHARGED.  IT IS A GOOD CYCLE TO DEAL WITH LITER-"
3730 PRINT #0,"ARY PEOPLE, WRITERS, JOURNALISTS, BOOK OR MAGAZINE PUBLISHERS,"
3740 PRINT #0,"BUT BE CAREFUL TO SCRUTINIZE ALL LEGAL AND OTHER DOCUMENTS"
3750 PRINT #0,"MOST CAREFULLY BECAUSE DECEPTION IS POSSIBLE AND IT IS A CYCLE"
3760 PRINT #0,"WHEN FALSEHOOD IS AS ELOQUENTLY AND EASILY EXPRESSED AS THE"
3770 PRINT #0,"TRUTH.  MOST GREAT LOSSES THROUGH ROBBERY OR DECEPTION OR"
3780 PRINT #0,"MISUNDERSTOOD LEGAL SITUATIONS OCCUR IN THIS CYCLE AND YOU"
3790 PRINT #0,"SHOULD TAKE PRECAUTIONS TO PROTECT YOURSELF.  HOWEVER, IT IS"
3800 PRINT #0,"A GOOD TIME FOR STUDY AND FOR GAINING INFORMATION AND KNOWLEDGE"
3810 PRINT #0,"BUT IT IS NOT A PROPITIOUS CYCLE TO ENTER MARRIAGE, TO HIRE"
3820 PRINT #0,"HELP OR TO BUY HOMES, BUSINESSES OR LAND."
3840 RETURN
4600 REM FIFTH CYCLE
4610 PRINT #0,"THIS IS THE CYCLE IN WHICH IT IS POSSIBLE FOR YOU TO ACHIEVE"
4620 PRINT #0,"YOUR GREATEST SUCCESS IN YOUR PERSONAL AFFAIRS.  THIS IS THE"

4630 PRINT #0,"TIME IN YOUR YEARLY CYCLE WHEN YOUR INTERESTS WILL EXPAND AND"
4640 PRINT #0,"YOUR PROSPERITY INCREASE.  YOUR MIND LIKEWISE WILL BECOME A "
4650 PRINT #0,"MORE EFFECTIVE INSTRUMENT, SHARPER AND CLEARER. YOU WILL BECOME"
4660 PRINT #0,"MORE OPEN IN YOUR RELATIONS WITH OTHERS. MOVE WITH MORE CON-"
4670 PRINT #0,"FIDENCE AND DISPLAY SOCIABILITY, BENEVOLENCE AND SYMPATHY. "
4680 PRINT #0,"THIS IS THE BEST CYCLE FOR DEALING WITH THE LAW, WITH LAWYERS,"
4690 PRINT #0,"AND JUDGES, THE COURTS, GOVERNMENT OFFICIALS, MEN OF PROMINENCE"
4700 PRINT #0,"IN THE PROFESSION AND PEOPLE OF WEALTH.  IT IS ALSO A GOOD "
4710 PRINT #0,"CYCLE TO BEGIN NEW VENTURES THAT MAY TAKE SOME TIME TO GROW,"
4720 PRINT #0,"TO PLAN LARGE BUSINESS NEGOTIATIONS OR TO UNDERTAKE LONG"
4730 PRINT #0,"JOURNEYS.  IT IS PARTICULARLY GOOD FOR COLLECTING MONEY DUE"
4740 PRINT #0,"YOU FOR SPECULATIONS IN STOCK OR REAL ESTATE. BUT BE SURE TO"
4750 PRINT #0,"AVOID EVERY NEGOTIATION THAT IS NOT COMPLETELY LEGITIMATE."
4760 PRINT #0,"ALSO AVOID ANY DEALINGS IN CATTLE OR MEAT PRODUCTS OR WITH"
4770 PRINT #0,"MARINE AFFAIRS."
4790 RETURN
5600 REM SIXTH CYCLE
5610 PRINT #0,"THIS IS THE BEST TIME IN YOUR YEARLY CYCLE FOR REST, RELAX-"
5620 PRINT #0,"ATION AND AMUSEMENT.  THIS DOES NOT MEAN THAT BUSINESS WILL"
5630 PRINT #0,"NOT PROSPER.  ON THE CONTRARY, ALL GOOD AND LEGITIMATE BUS-"
5640 PRINT #0,"INESS WILL CONTINUE WITH ALMOST AS MUCH SUCCESS AS IN THE "
5650 PRINT #0,"PRECEDING CYCLE.  HOWEVER, NOW IS THE TIME TO MAKE LONG OR"
5660 PRINT #0,"SHORT TRIPS FOR THE PURPOSE OF RENEWING FRIENDSHIPS OR FOR"
5670 PRINT #0,"CULTIVATING NEW FRIENDS. MEN AMONG WOMEN AND WOMEN AMONG MEN"
5680 PRINT #0,"AND TO RENEW AND IMPROVE FRIENDSHIPS AND RELATIONS THAT "
5690 PRINT #0,"ALREADY EXIST.  IT IS A PARTICULARLY FORTUNATE TIME FOR"
5700 PRINT #0,"BUSINESS MATTERS THAT TOUCH UPON ART, MUSIC, LITERATURE, "
5710 PRINT #0,"SCULPTURE, PERFUMES, FLOWERS AND PERSONAL ADORNMENTS.  IT IS"
5720 PRINT #0,"A GOOD CYCLE FOR A MAN TO SEEK PREFERMENT OR FAVORS OR"
5730 PRINT #0,"BUSINESS AGREEMENT OR COOPERATION FROM A WOMAN.  JUST AS THE"
5740 PRINT #0,"THIRD CYCLE IS BETTER FOR WOMEN TO OBTAIN SUCH FAVORS FROM"
5750 PRINT #0,"MEN.  IT IS THE BEST CYCLE TO BUY STOCKS OR BONDS FOR "
5760 PRINT #0,"INVESTMENT AND TO EMPLOY OTHERS."
5780 RETURN
6600 REM SEVENTH CYCLE
6610 PRINT #0,"THIS IS THE MOST CRITICAL CYCLE OF YOUR YEARLY CYCLE.  DURING"
6620 PRINT #0,"THESE FIFTY-TWO DAYS THE ELEMENTS IN YOUR LIFE THAT ARE NO"
6630 PRINT #0,"LONGER NEEDED FOR YOUR DEVELOPMENT GRADUALLY FALL AWAY IN"
6640 PRINT #0,"ORDER TO MAKE WAY FOR THOSE WHICH ARE NEW AND BETTER.  OFTEN"
6650 PRINT #0,"THIS WILL CAUSE DISTRESS AND A SENSE OF LOSS AND MAY TEMPT YOU"
6660 PRINT #0,"TO FOOLISH ACTIONS AND DECISIONS.  REMEMBER IT IS A CYCLE OF"
6670 PRINT #0,"SEEMING DEVOLUTION WHICH ALWAYS PRECEDES A CYCLE OF EVOLUTION"
6680 PRINT #0,"AND NEW OPPORTUNITY.  TAKE ADVANTAGE OF THE MOMENTUM IN THIS"
6690 PRINT #0,"CYCLE TO RID YOURSELF OF THE OLD AND UNWANTED, BUT BE SURE TO"
6700 PRINT #0,"EXERCISE GOOD JUDGMENT.  IF THERE IS SOMETHING THAT HAS BEEN"
6710 PRINT #0,"HANGING FIRE AND IS ABOUT TO END, LET IT GO SO.  BUT DO NOT"
6720 PRINT #0,"DELIBERATELY BREAK TIES OR DESTROY RELATIONSHIPS THAT HAVE"
6730 PRINT #0,"PROVED VALUABLE.  FOR THE REASONS MENTIONED,"
6740 PRINT #0,"YOUR MIND IS LIKELY TO BECOME DESPONDENT AND YOU WILL BE"
6750 PRINT #0,"EASILY DISCOURAGED.  REMEMBER YOU ARE BEING INFLUENCED BY THE"
6760 PRINT #0,"DUALITY OF THE CYCLE YOU ARE IN AND DO NOT PERMIT THE "
6770 PRINT #0,"PESSIMISM YOU FEEL TO WARP YOUR JUDGMENT OR INHIBIT YOUR"
6780 PRINT #0,"DECISIONS.  THE DUALITIES OF THIS CYCLE EXERT VERY SUBTLE"
6790 PRINT #0,"INFLUENCES AND IT IS NECESSARY THAT YOU BE MUCH MORE ALERT "

6800 PRINT #0,"THAN NORMAL IN APPRAISING YOUR FEELINGS AND YOUR REACTIONS"
6810 PRINT #0,"TO EXTERNAL INFLUENCES.  IN THE FOURTH CYCLE IT IS ADVISABLE"
6820 PRINT #0,"TO SEIZE IMMEDIATELY UPON YOUR IDEAS OR HUNCHES AND MAKE "
6830 PRINT #0,"QUICK DECISIONS.  NOW THE REVERSE IS TRUE.  IMPULSIVENESS"
6840 PRINT #0,"WILL BRING DISASTER.  BE CAREFUL IN ALL NECESSARY JUDGMENTS"
6850 PRINT #0,"AND POSTPONE TO THE NEXT CYCLE, EVERY DECISION POSSIBLE.  "
6860 PRINT #0,"HOWEVER, THIS IS A GOOD CYCLE FOR DEALING WITH OLDER PEOPLE"
6870 PRINT #0,"AND THOSE WHO BY THEIR NATURE OR POSITION MUST CONSIDER EACH"
6880 PRINT #0,"ACTION MOST CAREFULLY.  IT IS ALSO AN EXCELLENT TIME FOR "
6890 PRINT #0,"INVENTING THINGS OR DEALING IN INVENTIONS OR FOR APPLYING FOR"
6900 PRINT #0,"PATENTS OR COPYRIGHTS.  NOW YOU WILL HAVE SUCCESS IN DEALING"
6910 PRINT #0,"IN REAL ESTATE, MINES, MINERALS, AND ALL THINGS DEEPLY SEATED"
6920 PRINT #0,"IN THE EARTH OR IN HIDDEN PLACES.  ON THE OTHER HAND, IT IS"
6930 PRINT #0,"DEFINITELY THE LEAST FAVORABLE TIME OF YOUR YEAR TO START "
6940 PRINT #0,"ANYTHING NEW OR LAUNCH A NEW BUSINESS OR TO MAKE NEW EXPEND-"
6950 PRINT #0,"ITURES IN AN OLD ONE."
6970 RETURN
```

BIT Bucket

HEMENWAY ASSOCIATES, INCORPORATED
101 Tremont Street
Boston, Massachusetts 02108
617-426-1931

HA picked PASCAL as its first HLL for 16-bit uPs because of its wide acceptance in the Engineering World, the availability of PASCAL programmers and the numerous textbooks describing and teaching PASCAL. Of key importance is the fact that HA could implement a version that is easy to use and avoids many of the problems that plague most implementations.

The compiler is a true compiler that produces native code. It runs under either HA-SP/68000 or HA-SP/18000 operating systems although the code it produces can run standalone. The operation of the compiler is:

1. Edit a source PASCAL program.
2. Compile the source producing Macro Calls.

3. Assemble the Macro Calls together with the supplied Macro library to produce relocatable object code.

4. Link and relocate the relocatable object code producing native machine code.

Single U.S. end-user price is $400.00. Licensing information is available upon request.

HA-PASCAL/I

For M6800 and Z8000 16-bit uPs

HA-PASCAL/I is an industrial version of PASCAL aimed at the OEM industrial market. It supports all of the functions of PL/M-like compilers, but the syntax is PASCAL, a more acceptable language to the OEM market. It finds its widest use in coding programs for typical process-control and controller applications. Its features include:

* Port I/O support
* 32-bit arithmetic
* Access to memory on a byte or word basis
* Assembler routines callable for time-critical applications
* Entire set of PASCAL control structures
* Complete set of useful external functions
* Allows interrupt or real-time operations
* Debugging using the machine monitor
* ROMable object code
* Runs very fast
* High-efficiency code production
* Supports separate compilation

SOFTWARE ENGINEERING & TECHNICAL WRITING SPECIALISTS

Alford and Associates
P.O. Box 6743 Richmond, Virginia 23230
phone 804-320-3720

17 OCTOBER 1980 - NEW PRODUCT RELEASE - SCREDITOR II

Alford and Associates is pleased to announce its new SCREDITOR II screen editor/formatter, now available for immediate shipment.

Unlike most editing utilities available for the 6800, the SCREDITOR II is designed with the office typist in mind. Such features as FULLY DYNAMIC MARGIN and TAB SETTINGS, SYMBOL DEFINITION/INSERTION to eliminate the re-typing of often-used words, sentences and command sequences, QUEUE-BUFFERED KEYBOARD TYPE-AHEAD to allow sustained operator through-put, FULL JUSTIFICATION (left, right, center, fill), eliminate the need for post-edit processing on most office jobs.

The SCREDITOR II supports sixty-one commands, from simple cursor movement operators to paragraph re-formatting and file merging. Since an operator's reference card is supplied with the program, and because most commands are simple English abbreviations, the learning curve for the SCREDITOR II is much shorter than with other editors.

The SCREDITOR II is supplied with a SYSGEN program to generate custom system handlers without the need for machine code patching, a ONE-HUNDRED PAGE MANUAL and the OPERATOR REFERENCE CARD, all for only $79.95. Versions are available for TSC FLEX 1.0, 2.0, SWTPCo mini-FLEX, and SSB DOS66. Shipment is normally within three days of receipt of order. MASTERCHARGE, VISA, COD's, and personal checks are all accepted. Phone or write:

ALFORD AND ASSOCIATES
P.O. BOX 6743
RICHMOND, VIRGINIA. 23230
804-320-6722

COMPUTERWARE SOFTWARE SERVICES

SMALL BUSINESS PAYROLL SYSTEM

The Payroll Processing System provides an easy and accurate method of calculating and reporting payroll information for the small business. Any Company with more than two employees will find that this system pays for itself in a short period of time!

This Payroll System allows the input of standard information on all employees, (name, address, social security number, exemptions) as well as pay rates for standard hours, overtime hours, and salary. The system handles hourly, salary, and commissioned employees as well as weekly, bi-weekly, semi-monthly, and monthly pay periods. Two miscellaneous deductions are allowed per employee which may be applied as either a rate per hour worked, a percent of gross wages, or a flat dollar amount per pay period.

Once all activity for each employee has been entered into the system, generating the payroll is essentially automatic. Gross wages, FICA taxable wages, federal withholding taxes, state withholding taxes, FICA taxes, SDI deductions, and net wages are calculated quickly and accurately. The Payroll Year-to-Date File is updated with current and year-to-date information. A table feature allows the user to change tax rates, maximums, and Federal withholding ranges as often as the government does. SUI, FICA, FUI, SDI, and city or local tax rates can be changed easily through Table Processing.

The reports available include: Employee Cross Reference, Employee Master Report, Year-to-Date Audit Report, Check Stubs and the Payroll Register Report. Several sort sequences and selective report criteria are provided.

Users having need for a more extensive Payroll System should consider our Commercial Payroll Processing package, which includes Password Protection, Automatic vacation/sick time processing, cash advances, etc. Both Monthly and Quarterly information is maintained along with the following additional reports: Activity Input Forms, Quarterly Tax Register, W-2 Forms, State 941 Report, Employee Address Labels, plus others.

This system is designed to run on a 48K 6800/6809 computer with a minimum of a dual 5" disk system. Both SSB DOS and Computerware Random BASIC are required. Versions for other disk operating systems are pending customer demand. The Payroll System is available immediately for $200, which includes the state tax computation for your state.

A manual describing the operation & reports of either system is available for $15.00 from COMPUTERWARE - 1512 Encinitas Blvd. - Box 668 - Encinitas, Calif. 92024 - (714) 436-3512 or 436-0262.

Great Plains Computer Company, Inc.

P.O. Box 916, Idaho Falls, Idaho 83401 Phone (208) 529-3210

OSBORNE BUSINESS SOFTWARE

Accounts Receivable
Accounts Payable
General Ledger
Payroll with Cost Accounting

The four Osborne & Associates business programs are described in the set of three Osborne & Associates books available in most computer stores. These books functions as partial documentation for the software and include user manual and source code listing in Nano Basic.

The software, originally written in BASIC for a $30,000 Nova minicomputer has been converted to TSC Extended Basic by GREAT PLAINS COMPUTER CO., INC. The only changes made in the packages by Great Plains were those required by the differences in language or were enhancements of the original Osborne versions.

This enhanced implementation of the Osborne and Associates/McGraw-Hill business programs is the only one available with more capability than the original Nova minicomputer version. It has:

- KEYED FILES to eliminate slow searches and sorts.
- PASSWORD and MASTER PASSWORD PROTECTION to limit unauthorized access to your business data.
- SELF PROMPTING to perform data backups.
- NEW MODULES for additional usefulness. A Cash Journal Program, a Terminal configuration program, a file initialization program, a sample data base for practice and demo purposes, etc.

Each of the packages is sold in compiled form for a single user. Price includes disks, Osborne book, our own setup and user manual, and a confidential password letter.

Source is available to authorized dealer/OEM's for a nominal handling and shipping fee.

ACCOUNTS RECEIVABLE

The ACCOUNTS RECEIVABLE package is a open invoice system. You can enter an invoice at any time: before it is ready for billing, after you have billed it, and even after it has been paid. Accounts Receivable also has a provision for progress billing, which keeps track of milestone payments made before you are ready to bill the invoice.

One of the Accounts Receivable programs prints reports which list the invoices you have not billed yet, open items (unpaid invoices), closed items (paid invoices), and an aging analysis of open items.

Another program prints customer statements. Accounts Receivable will also post directly to several of the General Ledger accounts maintained by the GENERAL LEDGER program. The A/R programs maintain customer activity totals. Other programs allow the user to enter or modify the customer data base or correct previously entered invoice information. All keyboard entries are carefully checked for validity.

ACCOUNTS PAYABLE

The ACCOUNTS PAYABLE package is an invoice-linked system, which means everything revolves around the invoice. It features a flexible check calculation procedure that allows you to calculate checks in one of two

this year's or last year's totals are also included on the income statement. In addition to the balance sheet and income statement, you can print a trial income statement and trial balance. There is also a special report that lists the current account balance for selected accounts.

PAYROLL WITH COST ACCOUNTING

The Payroll programs perform all the necessary tasks like file maintenance, pay data entry and verification, computation of pay and deductions accounts-accumulation of totals by job and project reports and forms.

Two types of employees are defined: those paid a salary and those paid by the hour. Employees can receive a salary, regular hourly pay, vacation pay, holiday pay, piecework pay and overtime pay. In addition to these standard types of pay, special taxable and non taxable lump sums (for example, bonuses and travel reimbursements) can be paid.

Employee earnings data can be entered daily or less frequently, as it is entered, a copy plate of payroll earnings data can be associated with a job number. This allows payroll costs to be distributed among the various jobs. Each employee's earnings data is accumulated and added to permanent records at the end of the pay period. Taxes are computed on the total accumulated pay, and then deducted from it. Paychecks are printed based on the pay accumulations and deductions.

The results of the paychecks calculations are accumulated to monthly, quarterly and yearly totals. Selected information from each paycheck is also saved to provide a history of every check paid to each employee. These cumulative totals and historical records are the basis for printing the payroll journal, government tax forms, and other reports.
Royal you can choose a set of vendors and A/P will pay all their invoices and apply all their credit memos automatically, or you can list specific invoices and credit memos for payment for specific vendors.

There is a program to print the calculated checks on check forms. Another A/P program prints an open or closed item listing, plus an aging summary for all open items. The aging can be 30/60/90 day, or any other basis you choose.

You can distribute the amount of each invoice to as many as 9 different General Ledger accounts. The programs automatically make postings to the Cash and Accounts Payable accounts. The A/P programs also maintain vendor activity totals.

GENERAL LEDGER

The GENERAL LEDGER accepts postings to the various accounts from three external sources: Payroll, Accounts Payable, and Accounts Receivable. You may also enter postings directly. This allows you to adjust erroneous postings, and to make postings to accounts normally unaffected by Payroll, Accounts Payable, or Accounts Receivable.

You can format your own balance sheet and income statement. You have freedom to place titles and headings, skip lines or pages between accounts, and generate subtotals and totals throughout the reports--up to ten levels if you need them. You can print the balance sheet and income statement for the current month, current quarter, or any of the previous three quarters.

STAR-KITS

P.O. BOX 209
ST. JOHN'S, NEW YORK 10549

November 25, 1980

Mr. Don Williams, Sr.
'68' Micro Journal
3018 Hamill Road
Hixson TN 37343

Dear Don:

After the review of the MUMBUG 6800 monitor in four November 1980 issue, several readers asked why it wasn't available for the 6809. Well, now it is!

MUMBUG-09 was developed under an entirely different philosophy from other monitors. In order to retain many of the convenience features users have come to like - and feel comfortable with - on the 6800, we decided not to support big systems with MUMBUG-09. Hence it will not run with systems over 64K, or with the DMF-2 disk. In all other respects, however, MUMBUG-09 is compatible with existing software and disk operating systems.

MUMBUG-09 has all of the routines and standard commands of other monitors. But it also features multiple breakpoints, single-stepping, memory disassembly, formatted memory dumps, memory test, memory move, memory compare, memory search, memory fill, and more. An Abort function allows you to stop a running program, return to monitor, and print a register dump; the program can then be continued, modified, breakpointed, or single-stepped. Thus it has full trace and debugging facilities.

It also supports multiple I/O ports and makes it a cinch to steer output to a printer or user-written routines. The system can be halted and restarted from the keyboard.

Perhaps most important, though, is that MUMBUG-09 is easy to use. There are no surprises - it always does what you expect it to do. It is a direct descendant of our 6800 MUMBUG which has been in the field for over a year. Take breakpoints, for instance. Even if you forget where you've placed them, MUMBUG-09 will tell you where they are. And it won't forget about them if you do a reset. This is just one example of the human engineering that went into it. In a pinch, it even has a "help" command to remind you what it can do.

MUMBUG-09 treats the SWTPC DAT in a unique way so that it does not ignore non-RAM cards plugged into your system. This is a boon to users who have converted from 6800 systems and have cards such as video boards or disk controllers which do not work with other 6809 monitors. This makes the DAT into a help rather than a hindrance for the under-64K user.

The initial version of MUMBUG-09 is for the SWTPC MP-09 CPU board, and is supplied on two 2716 EPROMs (alternate versions are available). The price of $75 includes the EPROMs, a detailed manual, and the full and commented source code either as printed listing or on FLEX09 disk. Thus it will never be obsolete. Moreover, we will give full trade-in credit to owners of our 6800 MUMBUG if they decide to upgrade to MUMBUG-09 in the future.

Sincerely yours,

Peter A. Stark

Peter A. Stark

MOTOROLA *Semiconductor Products Inc.*

P.O. BOX 20912, PHOENIX, ARIZONA 85036

EXORset 30 — a new Motorola microcomputer development system supports the MC6809 microprocessor and will be supplemented with software that adapts it for use with other members of the M6800 microprocessor family. The completely self-contained desk-top system incorporates two built-in mini-floppy disk drives, a CRT display and an ASCII keyboard with special "user function" keys. It is supplied with a complete set of technical manuals and is modestly priced at $5995.



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'68'

'68' Micro Journal
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Hixson, Tennessee 37343

PRESS RELEASE

6800 - 68000 SOFTWARE DATA BASE ANNOUNCED

Computer Publishing Incorporated (CPI), recently announced the availability of a 6800 through 68000 software/hardware information service, according to Don Williams Sr., President.

CPI is the parent company of 68 Micro Journal, which is entering it's third year of publication. 68 Micro Journal reports exclusively on major aspect of the 6800 series of microcomputer devices. The Data-Base Division of CPI, in cooperation with 68 Micro Journal has compiled a comprehensive file of development and applications software for the 6800 series of computers, including the popular 550 bus configuration. Also covered these manufacturers, vendors and customers of the 6800 series, who have a need for specialized software and/or hardware presently available, but who are unaware of the extensive items available or the sources.

With the introduction of several new multi-user, minicomputing disk operating systems, for the 6809 and 68000, the popularity of these CPUs has increased at a rapid rate. Recent benchmark studies of these new operating systems (6809) indicate they surpass many minicomputers. Development software for the 68000 has reached a stage of maturity allowing immediate applications software construction.

Over the last three years the 6800 series has evolved from the 'personal' class of microcomputers to ultra-sophisticated computers serving the scientific and business applications users alike the terms in microcomputing technology.

Complete details of this service may be secured from CPI, Data-Base Division, 3018 Hamill Road, Hixson, Tennessee 37343. Telephone 615 870-1993.

14 December 1980

68' Microjournal
P.O. Box 849
Hixson, TN 37343

Dear sirs,

I would like to know if a fellow reader has a copy of Technical Systems Consultants SL68-18 Subroutine Package for 6800 they could send me. I would pay the handling, copying and postage costs as well as paying TSC for their package which they have discontinued.

Has anyone successfully interfaced a Percom Speak-2-Me-2 between the SS-30 buss and Texas Instruments Speak and Spell. Can you use the numerical values for the vocabulary provided in the Percom manual with POKE commands in MINIFLEX BASIC directly? For this interfacing, is C1 the BUSY line and C2 the STROBE line on the MP-LA card? Is the strobe provided by C2 at least 20 micro seconds long? Only four bits are used but for four times for a 16 bit word so that four strobes are required by the speech generator. Will the MP-LA do this?

What is required on a computer to generate a graphics display which will show modes of vibration of a membrane and which will permit hardcopy of different stages in the vibration? Can you do this on a hobbyist computer?

I am enjoying putting together a JPC AD-16 card. The documentation is excellent. I am going to have to figure out where to change the software provided so I can have the Analog to Digital card on port 4.

Maybe you could have a census of unique applications 68' computer users have devised which others might put their computers to.

Thank you,

Jeffrey M. Craig

Jeffrey M. Craig
Apt. 912 - 3001 S. King Dr.
Chicago, IL 60616

GIMIX INC. 1337 W. 37TH. PLACE, CHICAGO IL. 60609
(312) 927-5510 TWX 910-221-4055

GIMIX 6809 GENERAL NOTES #1

GIMIX 6809 systems and CPU boards will support a variety of operating systems including FLEX9 and UniFLEX, from TECHNICAL SYSTEMS CONSULTANTS and OS-9, from MICROWARE SYSTEMS CORP.

Both UniFLEX and OS-9 require the GIMIX 6809 PLUS CPU boards. The STANDARD (#01) board does not have provisions for the 6840 programmable timer required by UniFLEX or the TIME OF DAY clock required by OS-9. While UniFLEX does not use the TIME OF DAY clock option, we recommend that it be ordered with all systems to provide for future compatibility.

Both UniFLEX and OS-9 also require the use of 2 port serial cards (#43). The 2 port serial card is recommended in systems using the GMXBUG-09 system monitor, as it allows you to take advantage of the serial print drivers included in the monitor. The 2 port serial card is available separately or as an option in system packages. When ordered as an option with systems, the card adds $40.02 to the base price of the system.

Current versions of UniFLEX for GIMIX systems require the SWTP DMF-2 disk controller, the SWTP compatible DAT option on the CPU board, and the UniBUG monitor. When the GIMIX DMA disk controller is available, at the end of the first quarter of 1981, a version of UniFLEX will be available for it. The GIMIX DMA version of UniFLEX will require the GIMIX enhanced DAT option. UniFLEX is only available as a terminal based system.

OS-9 will be available in versions for both video and terminal based GIMIX systems. Versions of OS-9 will be available for use with any of the GIMIX disk controllers. OS-9 level I does not require either DAT option, OS-9 level 2 for GIMIX systems will require the GIMIX enhanced DAT option. You must be sure to specify the type of system and controller when ordering OS-9 to insure that you receive the correct version.

Video based systems, and systems that use the GIMIX DOUBLE DENSITY or GIMIX DMA disk controllers require GIMIX versions of 6809 FLEX. The GIMIX 5/8 disk controller can be used with any version of FLEX that supports the SWTP DC-1,2, or 3 controllers. However, to use the 5/8 controller in a video based system, with 8" drives, or in 2MHz. systems, the GIMIX FLEX for this controller is required. Each GIMIX controller has its own unique version of FLEX that takes advantage of the features of that controller.

All GIMIX versions of FLEX are software compatible with standard versions of FLEX. Software written for any version of FLEX will run under GIMIX FLEX. However, due to differances in controller design, formatting, etc., disks written in the double density, single or double sided modes on SWTP DC-4 (double density 5 1/4") controllers are not interchangeable with those written on GIMIX controllers. Interchange between these controllers is only possible on single density disks.

FLEX and UniFLEX are tradenarks of TECHNICAL SYSTEMS CONSULTANTS, INC.

OS-9 is a tradenark of MICROWARE SYSTEMS CORP.

DON WILLIAMS, EDITOR & PUBLISHER
'68 MICRO JOURNAL
3018 HAMILL RD.
HIXSON TENN. 37343

DEAR MR. WILLIAMS
I JUST THOUGHT I'D WRITE TO TELL YOU WHAT A GOOD MAGIZINE YOU ARE PUBLISHING AND TO LET YOUR READERS KNOW OF A COMPANY I HAVE HAVE OUTSTANDING EXPERIANCE WITH. FIRST LET ME SAY THAT WHEN EVER POSSIBLE I LIKE TO BUILD MY EQUIPMENT MY SELF. SO WHEN A PARTS HOUSE GIVES ME A GOOD DEAL I LIKE TO TELL EVERY ONE ABOUT IT.

THE COMPANY IN QUESTION IS DAL COMP OF CALIFORNIA. ONE NIGHT WHILE MUSING OVER MY SYSTEM I DEC)DED TO ADD MORE MEMORY (16K WORTH). THE FOLLOWING AFTERNOON I CALLED DAL COMP TO ORDER SOME 2114 MEMORY CHIPS AT A FAIR PRICE. I EXPECTED TO WAIT ABOUT 2 TO 3 WEEKS FOR MY ORDER TO ARRIVE BUT JUST 3 DAYS LATER I RECIEVED MY ORDER.

NOW TO MOST PEOPLE THIS MAY SEEM LIKE A AVERAGE AMOUNT OF TIME. BUT BECAUSE I LIVE IN NORTHERN MAINE (HEREIN REFERED TO AS THE STICKS) THIS IS EXTREMELY FAST SERVICE.

ALSO I WOULD LIKE TO HERE FROM ANY OF YOUR READERS WHO HAVE THE PERCOM LFD-400 DISK SYSTEM AND MINIDOS +X AND HOW THEY HAVE LINKED THERE SOFTWARE TO IT.

SINCERELY YOURS

RIC FLICK

386 HICKAM DR.
LORING AFB ME.
04736

HELP

WOULD SOME KIND READER, IF HE CAN, PLEASE HELP ME GET MY SWPTC 6809 UP AND RUNNING. I'M HAVING TROUBLE CONNECTING MY CT-64 TERMINAL TO THE SERIAL INTERFACE OF THE 6809 SYSTEM. DOES ANYONE KNOW A HOOK UP I CAN USE? WOULD BE VERY GREATFUL FOR THE INFORMATION.

JOHN FIORINO
518-85TH STREET
BROOKLYN, NY 11209

***

CLASSIFIED ADS

SYSTEMS OR COMPONETS FOR SALE: SWPTC 6802 SYSTEM; PERCOM LFD400 W/2DRIVES; 40KRAM; MP-R,N,T; A/D CONVERTER; PERCOM SUPERBASIC, INDEX, MINIDOS+MORE. SYSTEM W/SOFTWARE-$2499 NEGOTIABLE, WRITE/CALL FOR DETAILS.

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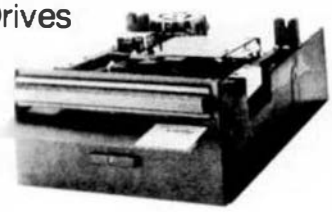
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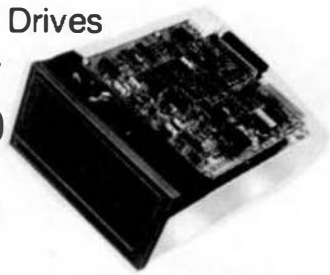


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DYNASOFT PASCAL 1.2

DYNASOFT PASCAL is a portable p-code implementation of a Pascal subset designed for cassette-based 6800/6809/6502 systems with at least 12K of available RAM.

DYNASOFT PASCAL includes the control structures of standard Pascal and the data types INTEGER, CHAR, BOOLEAN, SCALAR, SUBRANGE, POINTER and ARRAY. Version 1.2 now supports heap management using the standard procedures NEW, MARK, and RELEASE, and has a re-designed table-driven I/O system which permits adaptation to a wide range of peripherals, including disk. Its one-pass compiler produces compact ROMable p-code, and the 1.5K run-time interpreter can be supplied separately in ROM for dedicated controller applications.

The complete system is available for commercial users with interpreter source code and license for $85. Personal/hobby users may obtain the cassette and users manual only for $45, including air mail postage. Quantity pricing available on request. Check, money order, and VISA accepted.

dyna soft systems ltd.

P. O. BOX 51, WINDSOR JCT.
NOVA SCOTIA, CANADA
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SOFTWARE FOR PERCOM LFD-400

DIXIE a complete DOS package $60

FEATURES: ynamic allocation of disk space, 15 directory levels, 45 files per disk, 12 character names. Quick & easy conversion from MPX. RESIDENT COMMANDS: Create, release, rename, protect/unprotect, save, load, and execute FILE (at specified directory level). Create, release, and rename DIRECTORY LEVEL. Print disk label & number of free sectors. Print directory report (at specified level). Jump to address. UTILITIES: Convert MPX disk to DIXIE disk. Init disk. Change disk label. Single/dual drive disk copy. File copy. Directory report to printer. PATCHES: Percom SUPER BASIC, TOUCHUP editor, symbolic assembler, and HEXLDR. TSC cassette editor and assembler. SWTP 8K basic. REQUIRES: MIKBUG type monitor. MINIDOS 1.4. 800 words RAM. YOU GET: 2708 EPROM, 5 disks with source for all software. Manual.

XREF a cross reference patch $15

Adds a symbol cross reference assembly option to the Percom assembler (base & DIXIE-modified versions). Source code supplied on disk. Manual.

See review of DIXIE and XREF in Nov. '80 issue of '68' MICRO and note that the Percom SUPER BASIC patch and the MPX-to-DIXIE disk conversion utility are both now completed and supplied with the DIXIE package.

Michigan residents add 4%
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BLUE HAT SOFTWARE

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LFD-400, MPX, TOUCHUP, and MINIDOS are trademarks of Percom Data Co, Inc. MIKBUG is a trademark of Motorola, Inc.

POWERFUL INTEGRATED 6800, 6809 SOFTWARE

All software is supplied in relocatable format and may be loaded anywhere in memory

6800 RELOCATING ASSEMBLER AND LINKING LOADER. The assembler supports relocatable and absolute code, labeled common blocks, 47 error messages, alphabetized or non-alphabetized cross reference table, 8 char global and local labels, TSC source compatability, and much more. The linking loader will link up any number of object modules and place the resultant object anywhere in memory that you wish.
M68-ASMB-1A-10, M68-LOAD-1A-10.....$100.00

6800 ONE PASS LINK EDITOR. Functions in a similar manner to the linking loader except that the final object is stored back on disc as one object module. This module may then be loaded anywhere in memory by the linking loader (M68-LOAD-1A-10). This allows the creation of library of relocatable 'quick-load' modules.
M68-LNKA-1A-10.....$45.00

6800 TWO PASS LINK EDITOR. Similar to the one pass link editor. Some optimization is performed.
M68-LNKB-1A-10.....$45.00

6800 GLOBAL CROSS REFERENCE GENERATOR. Provides the capability to tell at a glance all object modules that reference a particular internal label.
M68-XREF-1A-10.....$35.00

6800 OBJECT DISPLAYER. Lists the header of an object module. Parameters displayed are program name, internal labels, external labels, time, date, and identification.
M68-DISP-1A-10.....$25.00

SPECIAL OFFER. All 6 M6800 programs above are available for.....**$200.00**

A 6800 users manual describing all 6 programs above is available for $15.00. This is refundable with your purchase of the assembler and linking loader. All 6800 software is supplied on 5-inch FLEX* discs and runs with FLEX* 2.0.

6809 RELOCATING ASSEMBLER AND LINKING LOADER. Supports features similar to those of the 6800 software above. Will also assemble 6800 and 6801 instructions.
M69-ASMB-1A-10, M68-LOAD-1A-10..... $100.00

The following 4 programs function in a similar manner to their 6800 counterparts.

6809 ONE PASS LINK EDITOR.
M69-LNKA-1A-10 .....$45.00

6809 TWO PASS LINK EDITOR
M69-LNKB-1A-10 .....$45.00

6809 GLOBAL CROSS REFERENCE GENERATOR.
M69-XREF-1A-10 .....$35.00

6809 OBJECT DISPLAYER.
M69-DISP-1A-10 .....$25.00

SPECIAL OFFER. All 6 M6809 programs above are available for **$200.00**

A 6809 users manual describing all 6 programs above is available for $15.00 (refundable with purchase of assembler and loader).

All 6809 software is supplied on 5-inch FLEX* discs and runs with FLEX* 9.0.

A CATALOG of all of our Software Products is available FREE for the asking.

*FLEX is a trademark of TECHNICAL SYSTEMSCONSULTANTS.

CINCITEK SOFTWARE

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DISCOVER THE 6809 IN YOUR COLOR COMPUTER!

Now you can explore the Radio Shack Color Computer's impressive potentials—as an inexpensive development system, a color peripheral, a process controller—ad infinitum. The Micro Works introduces these powerful software tools for utilizing the color computer at the assembly language level.

MONITOR TAPE: A cassette tape which allows you to:

- Examine or change memory using a formatted hex display
- Save areas of memory to cassette in binary (a "CSAVEM")
- Download/upload data or programs to a host system
- Move the video display page throughout RAM
- Send or receive RS-232 at up to 9600 baud
- Investigate and activate features of your computer, such as hi-res graphics or machine-language music
- Use your computer as an intelligent peripheral of another computer, for a color display or a 6809 program development tool

The monitor has 17 commands in all, and is relocatable and re-entrant.
80C Monitor Tape Price: $29.95

MONITOR ROM: The same program as above, supplied in ROM. This allows BASIC to use the entire RAM space. And you don't need to re-load the monitor each time you use it.
80C Monitor ROM Price: $39.95

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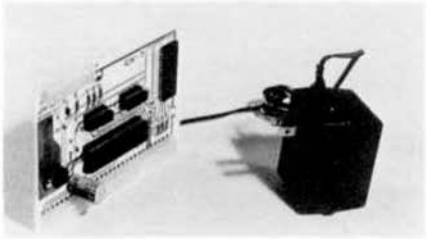
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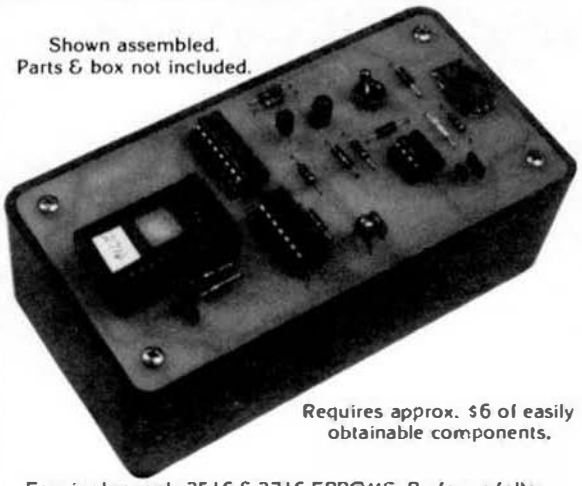


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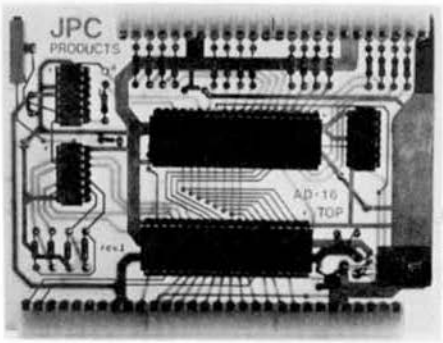
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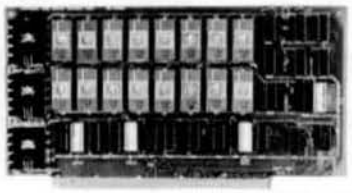


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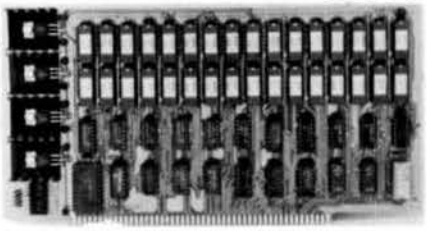
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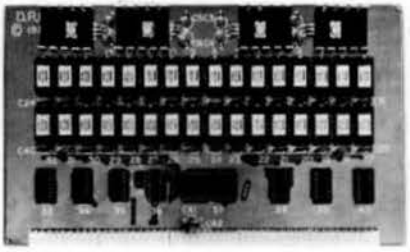
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Transparent to the fixed sector length, sub-records of related information are created only to the size required to conserve disk space. These sub-records can contain as many as 27 different fields of information. Each field in turn can contain either alphanumeric, integer or floating point data.

For those users who wish to write their own specific tasks for the database a complete source listing of all the subroutines is included at no extra charge.

BRIEF DESCRIPTION OF PROGRAM TYPES

CREATE DATA FILES The user specifies the file name, password and type of different data he wishes to store.

BUILD A FILE The user specifies the file name and is then prompted through the fields, he has previously specified, to enter the data he wishes to store. After verification the data is stored and the user prompted for the next group of data.

EDIT A FILE The user specifies which record he wishes and the data for that record is displayed. The user then has the option to alter any data contained by that record. Records can be specified by the actual record number or by the data being looked for by the user.

SORT PROGRAMS To organize the data in the most meaningful order the user can sort any file by any field, create a sorted keyfile or merge two sorted files together.

REPORT PROGRAMS meet the users individual needs reports can be completely customized. From a single record, labels or paginated sheet the user need only select the data he wishes to print and see only the data that meets a specified criteria. Report definitions can be saved and used to rerun new reports at any time.

FILE UTILITY PROGRAMS Enable the user to delete records, compress files, or modify any specified field data throughout the entire file. The user may also transfer data from one file to another.

GENERAL UTILITY PROGRAMS A group of utilities is provided to allow the user to view the directory of a disk, change the system date, print a source of a program, compare two programs for any differences or search a program for the occurence of any specified string without ever having to leave the DBMS.

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PAGES 3 & 48



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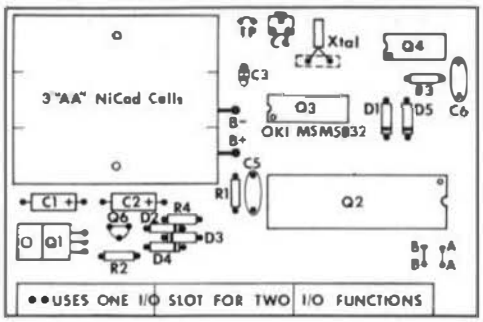
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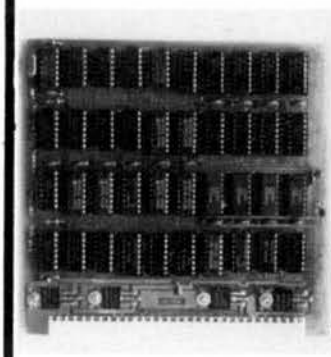
Specifications

Resolution	256 x 256 (256 x 250 on some monitors)
Bandwidth	8 MHz
Stability	crystal controlled
Addressing mode	X-Y single pixel
Origin	upper left corner
Writing rate	64 microseconds per pixel
Erase time	16.7 milliseconds
Write sync	interlocked
Blanking	program controlled
Output signal	non-interlaced composite video
Memory	65,536 bits in X-Y array on board
Registers	Write: X, Y, Z, Erase Read: status
Port addresses	4 in I/O address space
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IC count	40 + 4 regulators
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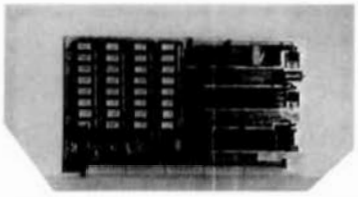
Part No	Description	Price
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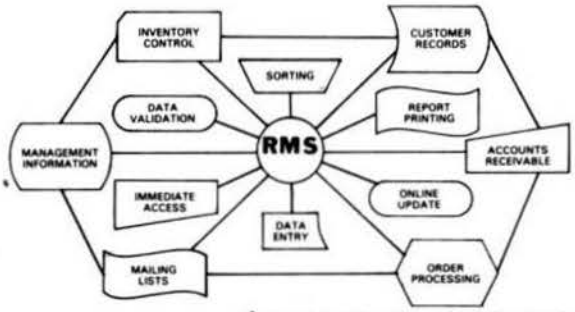
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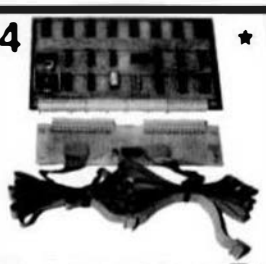
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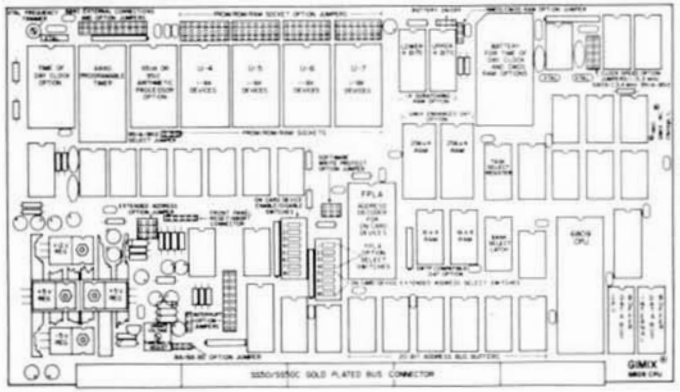
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GIMIX 6809 CPU BOARDS for the SS-50 BUS

The GIMIX 6809 PLUS CPU is an extremely versatile board that offers the user a great many features and options which make it an ideal choice for a variety of systems and applications.



- 4 PROM/ROM/RAM sockets for monitors and user software (up to 32K)
- PROM/ROM/RAM sockets individually jumper selectable for single or multiple supply voltage and 1, 2, 4 or 8K byte devices
- 1K bytes of scratchpad RAM (optional)
- 6840 programmable timer with provisions for external clock, gate and output connections
- Time of Day Clock (58167) w/Battery backup (optional)
- 9511A or 9512 Arithmetic Processor w/Jumper selectable 2, 3, or 4 MHz. clock speeds (optional)
- FPLA address decoding for the 8 on card devices 4 PROM/ROM/RAM sockets. 58167, 9511A/9512, 6840, 1K scratchpad RAM
- Software switching of address configurations for the 8 on card devices (allows software switching between on board PROM/ROM/RAM resident system monitors)

- All FPLA decoded devices can be individually enabled/disabled
- FPLA decoded devices are available for DMA access
- Extended addressing for the FPLA decoded devices (can be disabled)
- Software switching between on and off board system monitors using extended addressing
- Jumper selectable interrupts for the 6840, 58167, and 9511A/9512
- Any one of 3 memory management techniques can be used
  - Straight Bank Select
  - GIMIX Enhanced DAT w/software write protect (optional)
  - SWTPC compatible DAT (required for SBUG-E) (optional)
- Software write protect in 4K blocks, of the entire address space (when GIMIX enhanced DAT is installed)
- Jumper selectable processor clock speeds (1, 1.5, 2 MHz.) (2MHz CPU optional)
- Separate buffers for the 6809 and the on card devices

- NMI input can be jumpered to the bus or to an external connector
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- User defined latch output
- Gold MOLEX connectors for trouble free contact
- SS-50 and SS-50C compatible
- Full DMA capabilities (works with any of the 6809 DMA methods)
- Full Slow memory capabilities
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NOTE: The **GIMIX 6809 CPU BOARDS** do not include a baud rate generator. In systems that require a baud rate generator, it must be provided elsewhere. The GIMIX 6800/6809 mainframe includes a baud rate generator on the mother board.

6809 PLUS CPU #05 (With Time of Day Clock and Battery Backup Option Installed) $548.05

The GIMIX 6809 PLUS CPU board has a variety of other options that may be ordered at the time of purchase or added later. It is fully socketed to allow adding the following options at any time.

• 2 MHz 6809	$ 25.00
GIMIX ENHANCED Dynamic Address Translation	$ 35.00
SWTPc Compatible DAT (required for SBUG-E)	$ 15.00
1K NMOS Scratchpad RAM	$ 11.80
1K CMOS Scratchpad RAM w/Battery Backup (#05 Board Only)	$ 45.00

ARITHMETIC PROCESSORS

9511A (32 bit math w/transcendentals) 4 MHz	$312.00
9512 (64 bit math only) 3 MHz	$265.00

SYSTEM MONITORS FOR GIMIX 6809 CPU BOARDS

GMXBUG 09 is available for all versions of the GIMIX 6809 CPU BOARD. GMXBUG 09 includes advanced debugging capabilities, as well as utility and memory manipulation routines. It is available in both terminal and video based versions. The terminal based version is 2K long and requires a standard ASCII serial terminal. The video based version is 3K long and requires a GIMIX 80 x 24 VIDEO BOARD and a parallel ASCII keyboard. The terminal verison can be upgraded to video based by adding the extra 1K PROM, without modification to the original 2K terminal version.

GMXBUG 09 6809 System Monitor (Terminal Based) Includes PROMS, Manual and Source Listing	$ 98.65
Bootstrap PROM (for GIMIX and SWTP 5¼" Disk Systems)	$ 30.00
Video PROM for GMXBUG 09 (Includes Bootstrap)	$ 30.00
GMXBUG 09 Manual and Source Listing Only	$ 38.62

(GMXBUG 09 does not require a Dynamic Address Translator. However, it can be used with your choice of either GIMIX or SWTPc DAT. Please specify version desired when ordering.)

(GMXBUG 09 requires the 1K Scratchpad option on the CPU board. The price for GMXBUG 09 includes the 1K NMOS RAM option when ordered with the CPU)

To Substitute CMOS RAM with the above (#05 CPU Only) ..... Add $ 33.20

MICROWARE'S OS9 and SWTPc SBUG-E monitors are also available, contact GIMIX for information and pricing.



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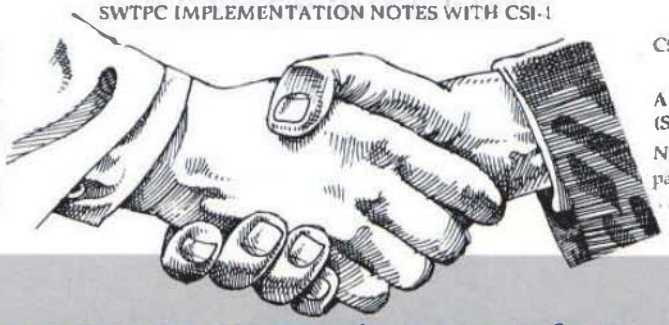
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